The INDUSTRIAL DIGEST

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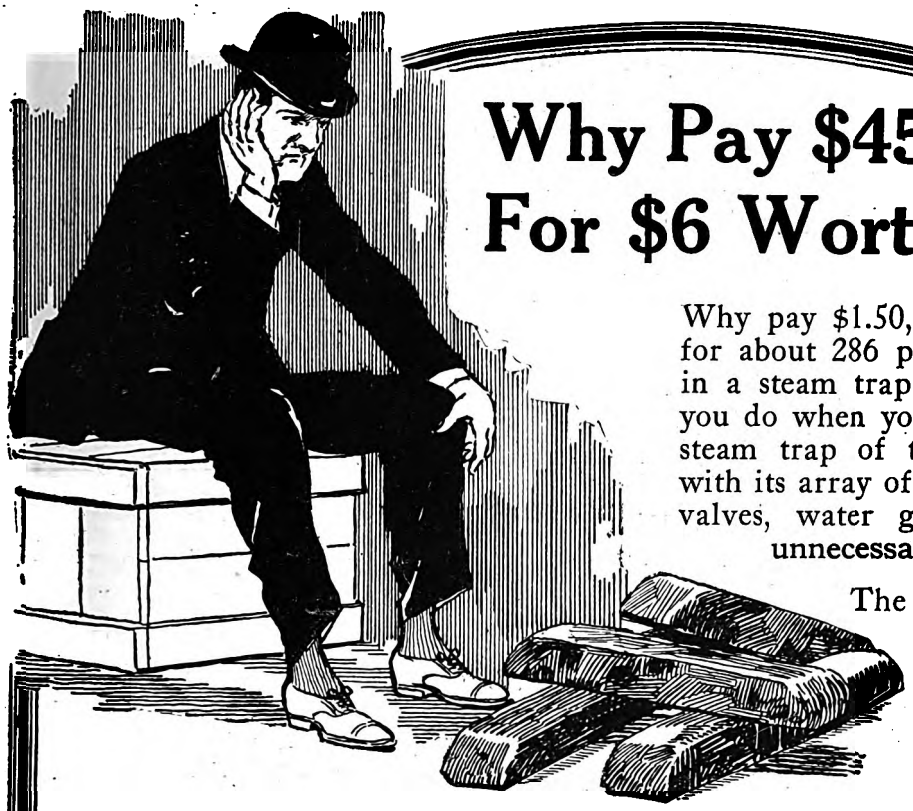
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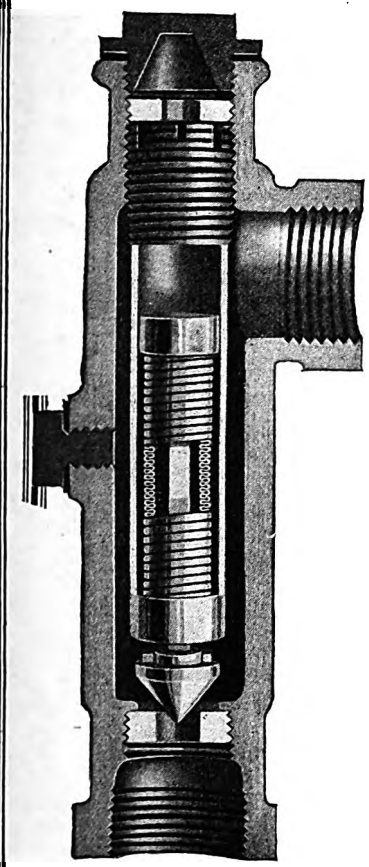
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THE INDUSTRIAL DIGEST

A fortnightly digest of
the informative articles in
six hundred leading industrial
magazines covering thirty industries

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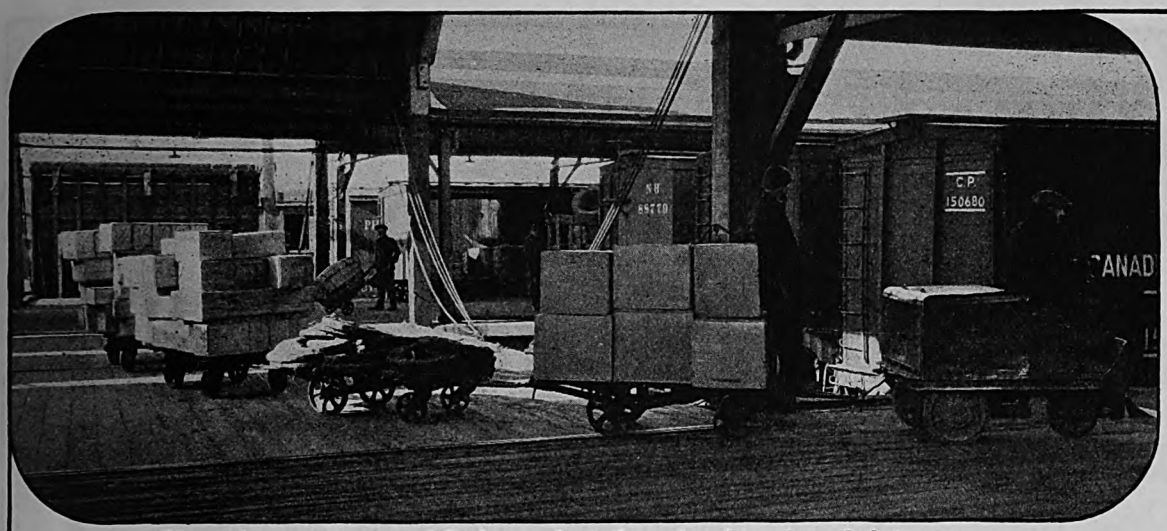
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Hyatt bearing equipped Lakewood trailers that have been helping to reduce handling costs at this busy freight terminal since November, 1920.

Handling Costs at Cedar Hill Reduced by Hyatt Bearing Trailers

At the big Cedar Hill freight terminal of the New York, New Haven & Hartford Railroad, 320 Hyatt equipped trailers are doing their part in handling freight at the lowest cost per ton.

These Hyatt bearing trailers have been in service constantly since November, 1920, with no bearing replacements, and it is to be expected that the bearings will continue to give this fine service throughout the life of the trailers.

When these trailers have to be moved by hand in making up trains, or when pushing them into the cars, one man easily handles each truck, instead of the two men necessary on the few plain-bearing trailers around the yard.

These easy running qualities are also an advantage when the trailers are pulled by tractors because storage battery strains are eliminated, noonday boosting of batteries is not necessary and each tractor can handle more trailers.

As Hyatt bearing trailers operate for three to four months on one application of lubricant, a real saving in material and labor is realized.

Reduce *your* handling costs to a minimum, specify that your manufacturer furnish you with Hyatt equipped trailers.

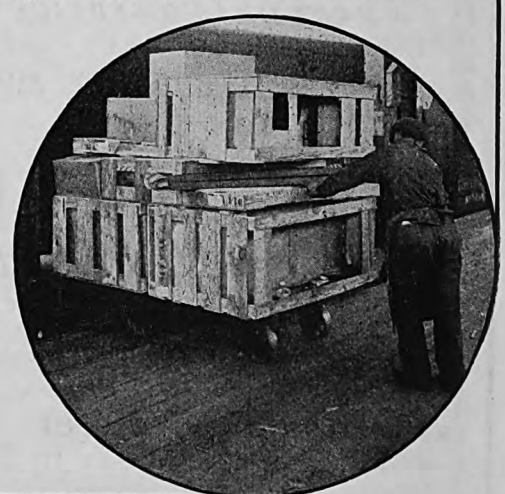
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USE HYATT BEARINGS ON YOUR LINE SHAFTS TOO
BULLETIN 125



CAPITAL RELEASED FOR OTHER PURPOSES

through Production Program

THE AMERICAN TOOL WORKS OF CINCINNATI,
through Mr. A. E. Robinson, General Superintendent, says:

Production Control on 50,000 Parts

"As we are manufacturing 60 different types and sizes of lathes, planers, shapers and radial drills, having nearly 50,000 parts, production control is imperative. In 1920 we employed L. V. ESTES INCORPORATED to help us cut down the physical effort required in following production, and reduce delays and interruptions in dispatching.

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"The Estes man installed a machine control board which enables us to load our machines intelligently, and check up on the work done. A new plan of routing our orders and a system of flow sheets showing the parts in process of manufacture make delays immediately apparent and easily corrected. In effecting these changes the work of the shop was never disrupted.

Stock in Process Cut Down and Capital Released

"Estes has cut down our stock in process, and so released capital for other purposes, by making up a production program in accordance with the actual and anticipated orders. By installing better guides and controls, he has reduced inventories of parts, relieved foremen and executives of details, and smoothed out the production flow. The very satisfactory savings effected will be greatly increased under normal conditions.

Estes' Prestige Aids in Securing Employee Cooperation

"The prestige of the Estes organization aids greatly in securing the cooperation of our executives and workers. Estes men appreciate the other man's viewpoint, are open-minded and can work harmoniously with any organization."

A PART OF OUR SERVICE is to send an engineer to your plant to examine conditions that exist and consult with you as to the value of changes that might be made. This service is *without charge to you—just write us that you would like to have it.*

L. V. ESTES Incorporated

INDUSTRIAL ENGINEERS

Costs **Accounting**

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JUN 15 1922
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Vol. 1
No. 16

THE INDVSTRIAL DIGEST

June 10
1922

The Business Weathervane

A Summary of Expert Opinion

"Business is going to be better in the fall, and prices are going to be higher." This is the consensus of opinion among those in a position to know.

* * *

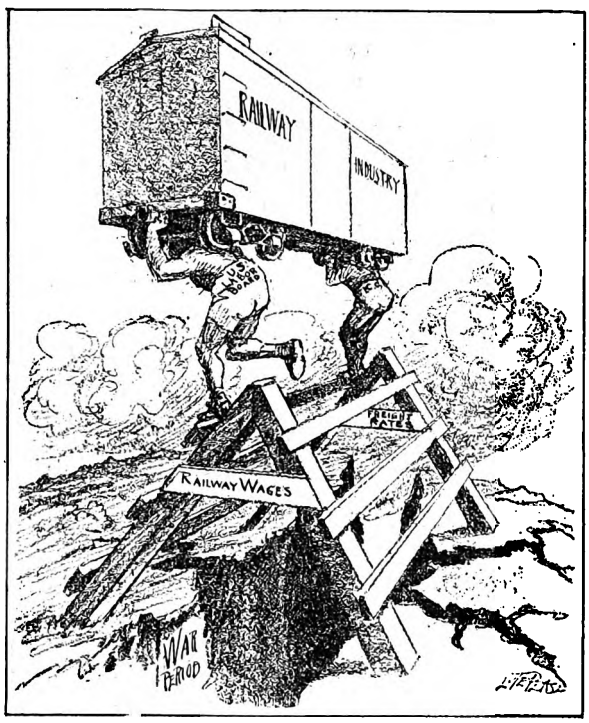
The **Brookmire Economic Service** points out that on the whole activity during the month has continued on the upward trend. "Although some of the textile lines showed slight weakness, iron and steel increased its output, copper strengthened, building remained at its high level of activity and building materials were in heavy demand, carloadings increased, and general purchasing activity, as measured by bank debit figures, recorded a fairly substantial gain. On balance from reports of widely varied fields the month witnessed an orderly, if not rapid, advance in general activity.

"As far as sectional activity was concerned, the eastern portion of the central group of States, due to the increasing production of iron and steel, reported a substantial gain in purchasing activity over the previous month. From the sales standpoint it is worth noting the rapidity with which the Southern States are renewing their buying. From present indications, they are leading the agricultural regions in their return to activity. The rapid and material increase in the gross earnings of railroads serving that territory and comparative purchasing figures tell of increasing buying pressure, especially in the eastern States of the group."

According to the monthly review of the **Federal Reserve Board,** "In appraising the manufacturing situation a distinction must be drawn between basic commodities and those of a more highly finished sort. The marked improvement in the case of iron and steel noted in business surveys of previous months has continued during May, unfilled orders increasing materially and ingot production being the greatest in any one month since November, 1920. The demand for iron and steel products continues particularly strong in the case of automobiles and railway supplies. Much the same may be said with respect to copper and the other non-ferrous metals. The advances in the price of copper and the reduction in stocks which had previously occurred have been accompanied by a general reopening of mines and a corresponding increase in the demand for mine labor."

In the opinion of the **Harvard Economic Service,** "Recent weeks have witnessed a further expansion of industrial output. The adjusted index of the volume of manufacture is now approaching 100. Last summer it fluctuated around 75. The steady upward movement of production during the intervening months has afforded one of the most solid bases for optimism, since the increase of output has been in response to a definite increase of demand. This stimulus is more and more manifest. It has recently shown itself in generally advancing wholesale commodity prices.

"Were it not for the labor difficulties which now prevail so widely a further increase of production during the next few weeks might be confidently predicted. As matters stand, the immediate prospect is somewhat uncertain. The protracted strike of the cotton mill workers in New England is interfering perceptibly with output in this trade. And the coal strike, though involving no serious curtailment of operations in other industries thus far, is apparently beginning to pinch. Unless substantial alleviation of these difficulties is effected soon, a retardation of the increase, or perhaps even a decline, in the volume of manufacture is to be expected."

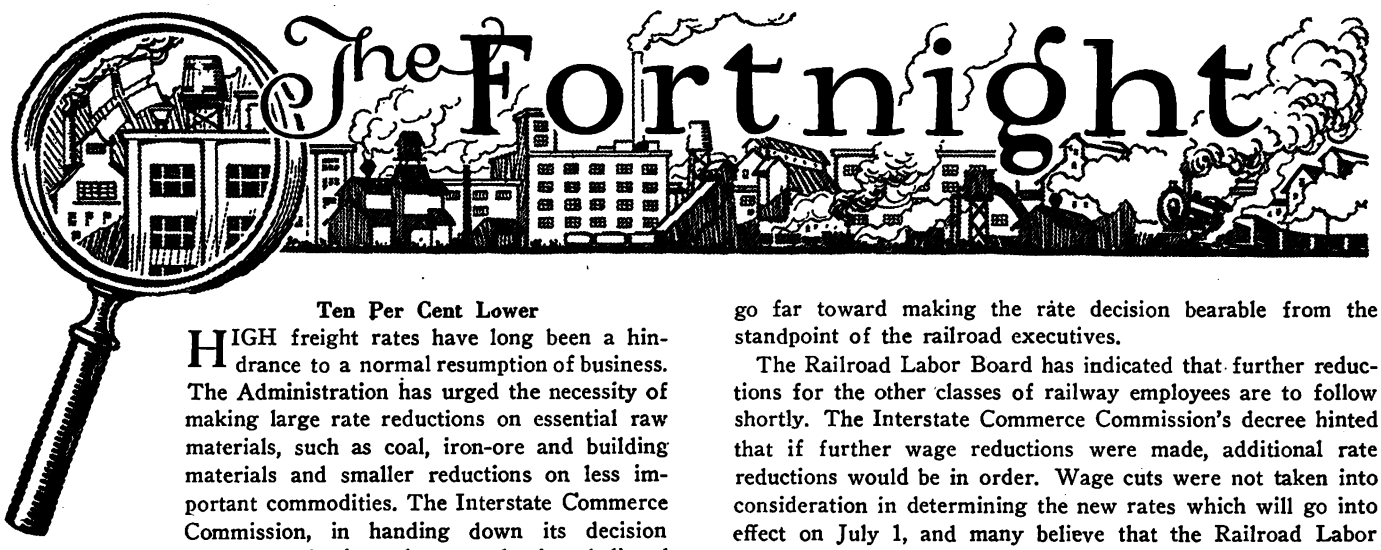


(Newark Evening News)
"Up Together, Down Together."

The **United Business Service** believes that "In the most important item—food—it is evident that retail prices are now lower than they have been at any time since April, 1917, while wholesale prices were at their lowest about the middle of last summer, and their trend at present seems to be slightly upward. The result should be a lessening in the

(*Turn to page 1108*)





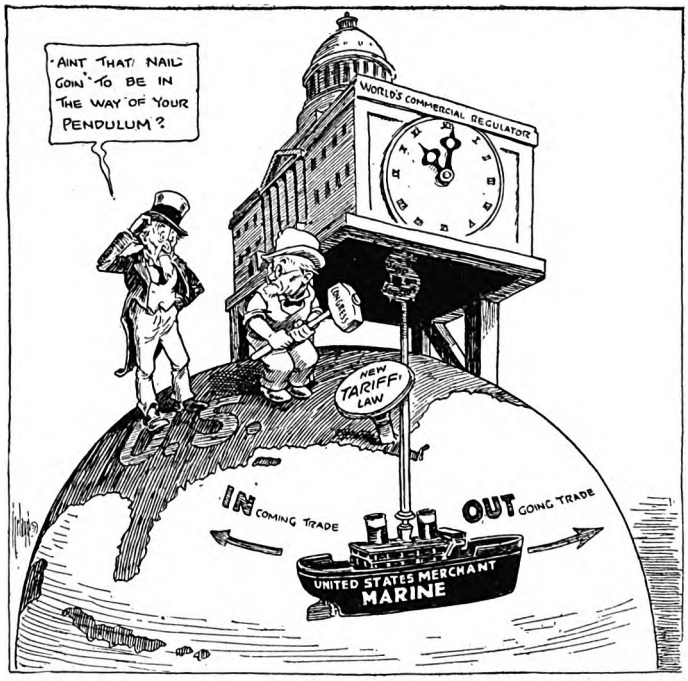
Ten Per Cent Lower

HIGH freight rates have long been a hindrance to a normal resumption of business. The Administration has urged the necessity of making large rate reductions on essential raw materials, such as coal, iron-ore and building materials and smaller reductions on less important commodities. The Interstate Commerce Commission, in handing down its decision announcing a 10 per cent horizontal rate reduction, believed that a uniform cut in freight rates would have a more stimulating effect on the country's business.

The reduction in rates, as stated by the press, might well be misunderstood. The commission states that where the increase in rates as of August 26, 1920, amounted to 40 per cent, the new rate must be only 26 per cent above the base used for the 40 per cent increase. That is to say, a 14 per cent decrease on the basis prevailing before the last increase—but since the present rate is 140 per cent on that basis, the decrease from *current* levels will be only 10 per cent. A similar reduction will give the same 10 per cent result from the present level in each of the territories.

Passenger and Pullman rates were not affected by the decision. There has been considerable discussion in the press on this point and opinion seems to be general that a passenger rate cut is sorely needed.

In those cases where voluntary reductions on specific commodities have already been made, those reductions will be considered as a part of the decrease now ordered. Naturally the railroads have already made voluntary reduction on those commodities where a rate cut would be most likely to increase the volume of shipments. Consequently, the most valuable reductions so far as business stimulation is concerned have already been made.



(Columbus Dispatch)

A Pendulum Must Swing Both Ways.

How It Affects the Roads

THE rate reduction is estimated to reduce the gross income of the roads by about $450,000,000, annually. But previous reductions have already accounted for a reduction of approximately $200,000,000, which means that the Interstate Commerce Commission's decision will force a further reduction of only $250,000,000 annually. The rate reduction was followed almost immediately by the announcement of the Railroad Labor Board to the effect that wages of maintenance-of-way employees are to be cut on an average of 13.2 per cent. This will take $48,000,000 a year from the pay-roll of the railroads and will go far toward making the rate decision bearable from the standpoint of the railroad executives.

The Railroad Labor Board has indicated that further reductions for the other classes of railway employees are to follow shortly. The Interstate Commerce Commission's decree hinted that if further wage reductions were made, additional rate reductions would be in order. Wage cuts were not taken into consideration in determining the new rates which will go into effect on July 1, and many believe that the Railroad Labor Board's decision indicates further rate reductions in the Fall.

Railroad employes are not taking the cut supinely, and on June 6 announced a conference at Cincinnati to consider a plan of campaign and possibly a strike.

Traffic Increase

THE roads will benefit not only by the reduction in wages which has been granted, but also by an increase in traffic, which is certain to follow. That the outlook for rail stocks is favorable was indicated by a firmness on the publication of the rate reduction.

That general business will respond to the rate reduction is a foregone conclusion. Transportation costs are an important element in living costs. When wool is transported to the mill, when clothing is sent to the manufacturer, when the suit is sent to the jobber and then to the retailer, freight rates play a large part in the prices of everyday articles of clothing. Naturally, one effect will be to delay the purchase of raw material or at least the deliveries of stock until after the first of July. There is no question, however, but that we are on the eve of steady price advances on practically all commodities, and it is possible that any saving in freight will be more than overbalanced by the higher prices later on.

Nearing the Danger Point

FOR nine weeks the coal strike has been dragging along with no settlement in sight. Our "April Fuel" strike may prove troublesome unless something is done quickly, and so the Government has called a conference of coal operators with Secretary of Labor Davis. Estimates place the amount of bituminous coal still in reserve at approximately 32,000,000 tons, but experience proves that in times of coal shortage whenever reserves get below 20,000,000 tons, prices start to climb and the famine is felt. This leaves a balance of some 12,000,000 tons before the consumer feels the pinch. The consumption of coal is now about 3,000,000 tons a week in excess of non-union production. This excess may be reduced

in Perspective

to 2,500,000 or 2,250,000 a week if the non-union mines increase in efficiency, as expected. So it is not difficult to determine that in another month manufacturers are going to have trouble in getting soft coal unless the strike is settled shortly.

In the meantime, Secretary Hoover has stepped into the breach with his announcement of a fair maximum price of $3.50 a ton for bituminous coal at the mines in 80 per cent of the present production fields. Because of possible infringement of our peculiar anti-trust laws, Secretary Hoover did not ask the 500 producers, whose mines are still in operation, to agree among themselves as to a fair price but assumed all responsibility. When our Secretary of Commerce finds it necessary to request industrial leaders to overlook an antiquated act of legislation, it is in the opinion of many editors about time that the legislation be abolished.

Steel Production Increases

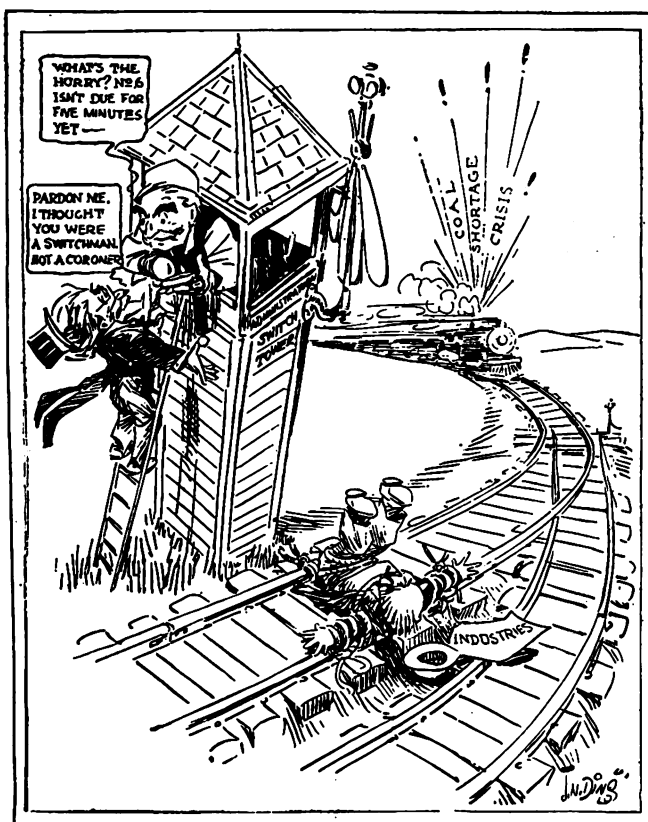
THE remarkable activity in the steel industry, especially as regards fabricated structural steel, is largely occasioned by the building boom. The contracts already awarded do not begin to equalize our shortage of industrial and residential buildings. The late lamented period of depression differed in one essential from all other similar periods—a shortage of dwelling houses. In the past, depressions have found us overbuilt—but today there is a shortage in practically every part of the country. The fact that contracts are still being awarded in large volumes is a very healthy indication because of the building industry's intimate contact with other industries. Take for example, the lowly bathtub. Using the index number of 100, orders for bathtubs in December were 112, in January, 142, in February 152, as compared to 82, 65, and 71 respectively for the same three months last year. This same increase in activity is found in the glass industry, furniture industry, the electrical fixture industry, and many others.

More Mergers

THE so-called "six company" steel merger dwindled down to three when negotiations were completed—The Midvale Steel & Ordnance Co., the Republic Iron and Steel Co., and the Inland Steel Company. The new company, which will probably be called the North American Steel Corporation, may later absorb the Brier Hill Steel Co., and the Steel & Tube Company of America. Another important merger, that of the Selden Motor Truck Corporation and the Atlas Truck Corporation, has just been completed. It is reported that the consolidation, which will be known as the Industrial Motors Corporation, will attempt to do for the motor truck industry what the General Motors Corporation has accomplished in the pleasure car field.

Then there is the consolidation of independent coal properties, worth about $40,000,000, in the Panhandle region of West Virginia. It is said that the surveys of the properties are almost complete and financial arrangements almost agreed upon. John A. Bell, chairman of the Carnegie Coal Company, is mentioned as one of the leaders of the merger operation,

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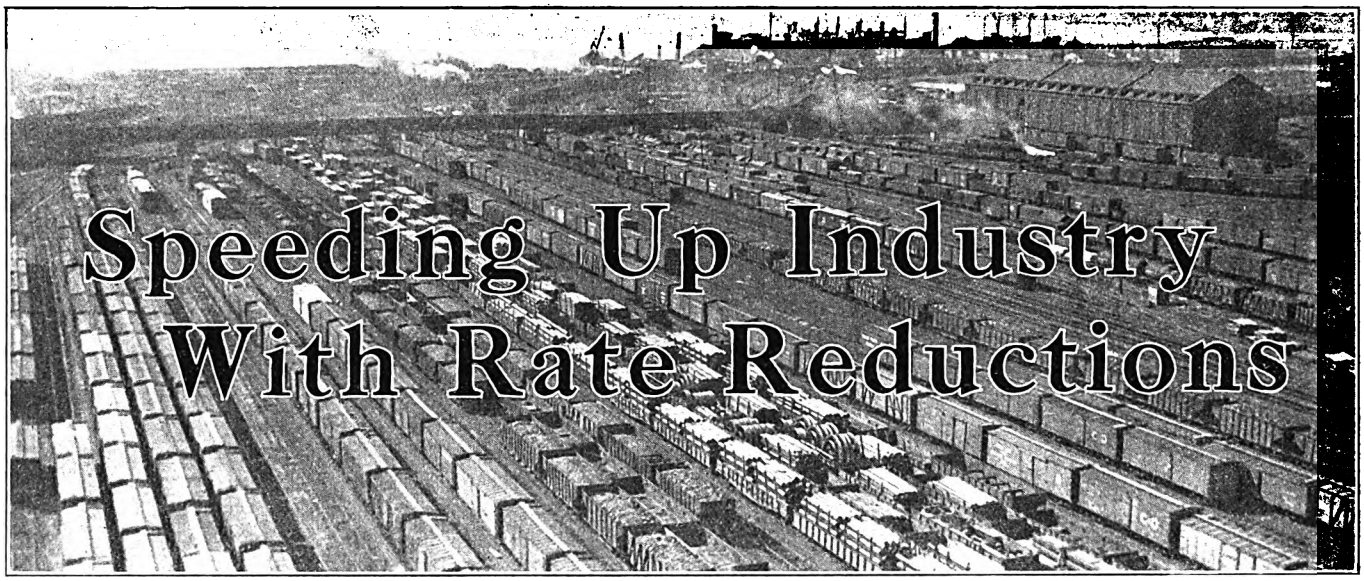
(Philadelphia North American)

Still Waiting for an Emergency



(Kansas City Star)

The President Induces the Gentleman to Step Aside



Speeding Up Industry With Rate Reductions

AN expression of satisfaction arose from American business men when they heard that the Interstate Commerce Commission had ordered a 10 per cent horizontal reduction of railroad freight rates. The applause was not enthusiastic—no one seemed to think that the rate reduction would bring on an immediate boom—but it was virtually universal. Even the railroad executives failed to object seriously, perhaps because they knew a reduction of wages would follow the cut in rates. The general opinion seemed to be: "Every little bit helps, and business should be duly grateful for this slight boost toward prosperity."

A newspaper reporter in Philadelphia went the rounds of the important business men of his city to find out what they thought of the rate cut. The head of a firm of manufacturing chemists said it was "a very healthy sign of improvement in the times." "Everything in the building line will be aided," said the president of a contracting corporation. Local leaders in the steel industry said that the freight cut would furnish "the needed stimulant to make business better." The oil business, according to a leading Philadelphia representative of that trade, will receive no direct benefits but would "undoubtedly share in the general improvement that the rate cut would probably stimulate." Coal dealers told the reporter that if it were not for the strike they would expect "a marked improvement in the trade as a result of the rate slash." And so on.

The Greatest Beneficiaries

THE greatest benefit will, of course, be felt by the shippers and receivers of bulky commodities. A 10 per cent reduction in the cost of shipping a pair of shoes will not make a large hole in the total cost of the pair of shoes, but in the case of heavy building materials, coal and iron ore, the situation is quite different. The cost of transportation is a large item in the cost of these commodities, and a 10 per cent freight reduction is important.

The rate cut should reduce steel manufacturing costs by an average of at least $1.25 a ton, according to the *Wall Street Journal,* which says:

"Saving will vary with different localities and in respect to different products. In some districts assembly costs of pig iron are around $14 a ton, so that in these districts saving on iron alone would be $1.40 a ton.

"Present assembly cost of pig iron in Pittsburgh district is $10.48 a ton, which, with 10 per cent reduction, would drop to approximately $9.43. In Cleveland and Buffalo districts assembly costs on iron are lower, about $8 a ton, and reduction costs there would be about 80c a ton, while in Eastern districts assembly costs run to around $14.

"Exact figures on assembly costs of finished steel are not available and vary materially with different mills. On the standard products such as bars, shapes and plates, it is generally estimated that these costs, in Pittsburgh district, are usually in neighborhood of $12 to $12.50 a ton, while on more highly finished products they would be increased. It takes about six tons of raw material, ore, coal and coke, limestone, etc., to produce one ton of steel.

"Delivery costs to consumers will also be lowered appreciably by freight rate cut. Freight on one ton (2000 pounds) of steel from Pittsburgh to New York is $7.60. Under proposed new rates it would be only $6.84.

"It is doubtful, however, whether consumers will get any direct benefit immediately from lower rates except on delivery charges. For one thing, steel prices are still low, little above cost of production. Further, if the 12-hour day should be eliminated, as seems likely in view of President Harding's request to trade's leaders, this would doubtless mean an increase in costs that might fully offset the saving in assembly charges due to lowered freight rates.

"Saving of $1.25 a ton on steel assembly costs would, at current rate of output, mean an aggregate saving of at least $32,000,000 annually to the steel industry."

The Effect on the Coal Trade

AUTHORITIES on the coal trade estimate that the new freight rates will mean a reduction on bituminous coal of about 34c a ton to Philadelphia from the Pennsylvania and Fairmont, W. Va., coal fields, about 50c to central Massachusetts by rail from the Pennsylvania fields, and about 28c from Pocahontas and New River mines to the piers at Hampton Roads. The immediate effect of the cut will be to delay the buying of coal until after July 1, when the decision of the I. C. C. will go into effect.

Those who calculate the effect of the rate cut should bear in mind that the 10 per cent reduction is applied to rates as of August 26, 1920, and that the railroads since that time have voluntarily reduced rates on various commodities. These reductions, excepting the 16½ per cent reduction on grain, grain products and hay, will be replaced by the 10 per cent cut just ordered. This means, of course, that the reduction from present rates will be less than 10 per cent in many instances.

The actual reduction from rates in force today will probably be about 6 per cent, in the opinion of a railroad expert of Washington. According to the correspondent of the *New York Times,* he reached this figure in this way:

"He estimated that on the basis of operating revenue of the carriers in 1921, the 10 per cent decrease provided for in the commission's order would represent a loss of $450,000,000 in operating revenue. He stated that the loss of operating revenue on the same basis of calculation, because of readjustments and reductions made by order of the commission or

voluntarily by the carriers subsequent to August 26 and which are now in force, represented an annual loss in operating revenue of about $200,000,000. This would leave $250,000,000 annually as the additional loss in operating revenue to the railroads on the basis of 1921 business because of the commission's latest order. The order, therefore, he figured, would appear to represent an actual reduction from the rates in force today of perhaps 6 per cent."

In the opinion of Herbert Hoover, Secretary of Commerce, a rate reduction by commodities would have been of greater benefit to business than a horizontal decrease. Mr. Hoover urged before the committee that rates on some kinds of freight are low enough already, and on other kinds more than the average reduction might be required. But the commission, after considering the question in detail, concluded that a reduction by commodities was an impossible task at this time. Commissioners Lewis and Cox dissented. Mr. Lewis, in his opinion, went so far as to say that the 10 per cent horizontal reduction when spread over the entire freight traffic would prove an unjustified economic waste, and would have no perceptible influence in lowering costs of living or stimulating industry. Most observers, however, although they might grant that a reduction by commodities would be more desirable, seem to think that a horizontal cut is certainly better than nothing.

Why the Cut Was Made

BEFORE and after the promulgation of the decision by the I. C. C. came two events that throw light upon the rate cut and at the same time add to the difficulty of analyzing it. A few days before, the heads of the nation's important railway systems met President Harding at dinner and discussed rates. It was said a few days later at the White House, apparently at one of President Harding's informal conferences with newspaper correspondents, that "the railway leaders were adamant in their position that there can be no reduction in rates without a corresponding cut in wages." (The quotation is from a Washington correspondent of the *New York World.*) Then, a few days after the announcement of the rate cut, came a decision of the Railway Labor Board reducing the pay of 400,000 maintenance of way employes by 13.2 per cent. At the same time the board let it be known that it would shortly hand down decisions affecting the wages of 500,000 railway shopmen and 200,000 clerks, telegraphers, station employes and other minor groups.

President Harding's Role

THEORETICALLY there is no connection between the President's dinner and the rate cut, and between the rate cut and the wage cut. Yet there is a strong temptation to speculate about the actual relations of the three events. Did the President tell the railroad men at the dinner of the two forthcoming decisions? Did the railroad men accept the rate cut without protest because they knew there was a wage cut to follow?

The I. C. C. said in its rate-cut decision that previous wage reductions had not yet been counterbalanced by sufficient cuts in rates, and hinted that future wage cuts would be followed by further rate slashes. In other words, the commission's official position is that the present rate reduction has no relation to the present wage reductions.

The railroads certainly feel that there is a connection between the two. The commission, unofficially, must surely think so, too. It ruled that 5¾% of the aggregate value of railway property constitutes a fair return on the investment, and at the same time it cuts 10% off a schedule of rates which prevailed during a year when the railroads barely earned 3⅓%. Surely the commissioners had wage reduction in mind as one of the means by which the roads could make up the deficiency.

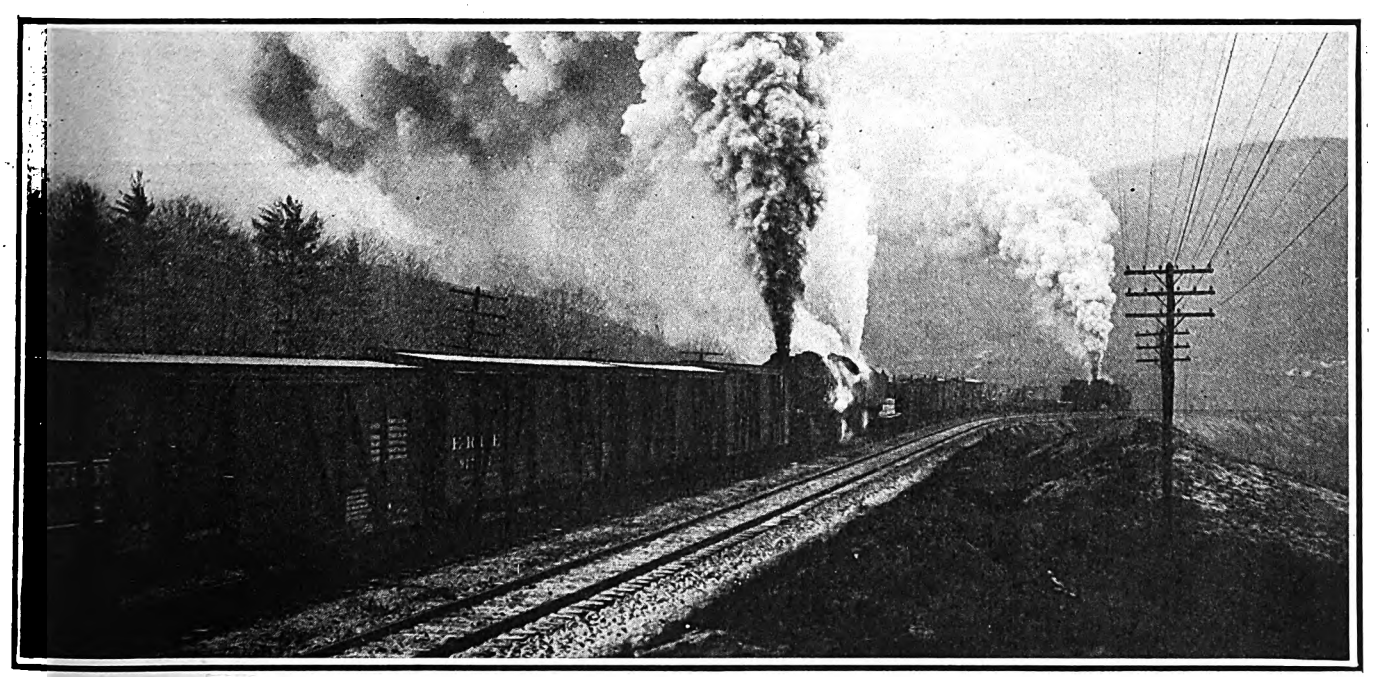
Reduced Rates Mean Reduced Wages

THE railroad executives, at any rate, are thinking of wage reductions. The *Railway Age,* which is considered one of their mouthpieces, commented as follows on the rate cut:

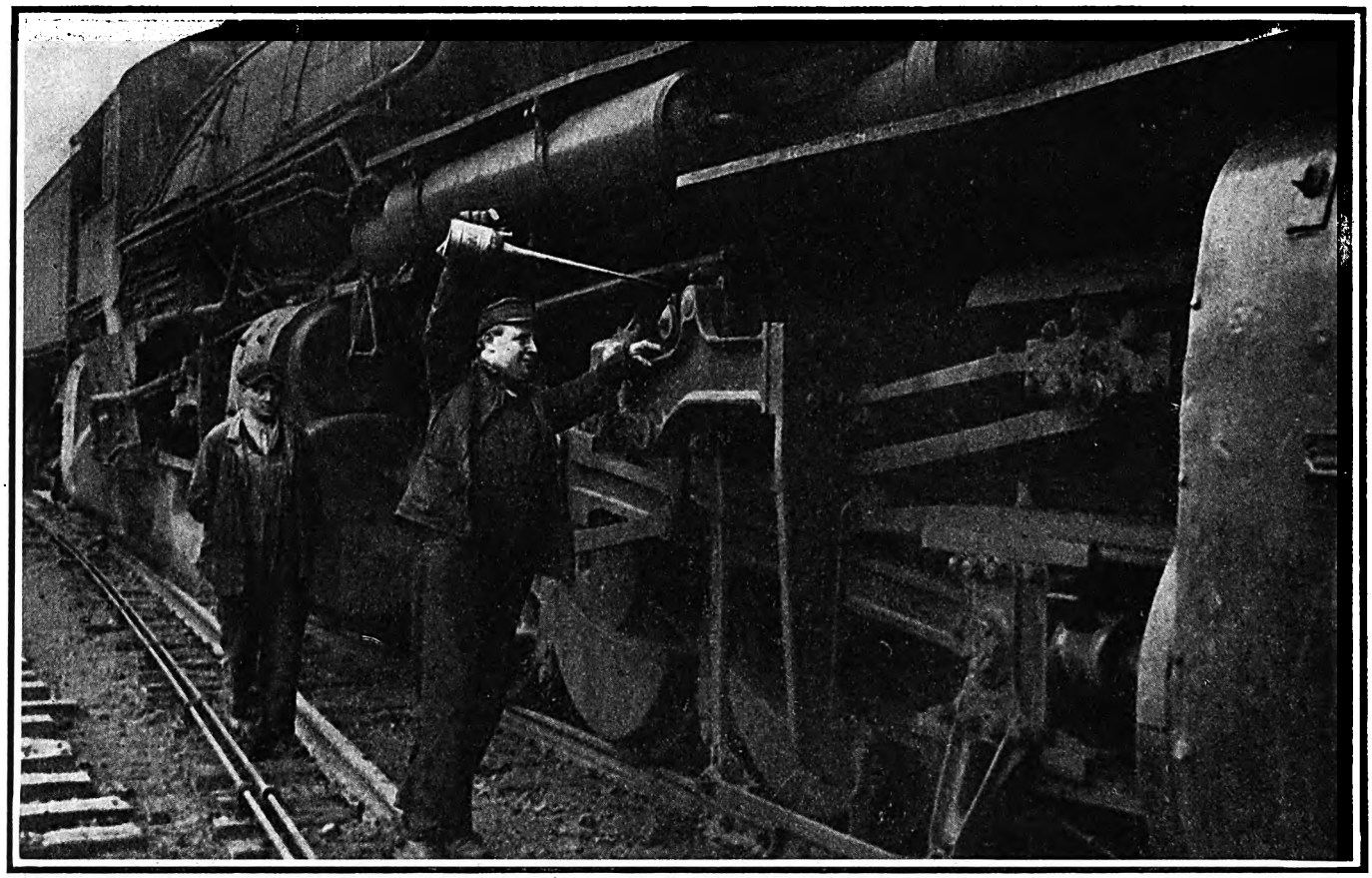
"It is difficult to see how the railroads can do otherwise than accept the commission's decision to reduce rates. They should, however, make their assent of greatest value to themselves and the public. . . . They should certainly express themselves about the activities—or rather the lack of activity—of the Labor Board with reference to the shop wages decision."

Organs of general public opinion, too, connect the rate cut with the wage reductions. The *New York World* thinks, with some misgivings, that the roads will try to pass the entire rate reduction along to labor. It says:

(*Turn to page 1058*)



Where "deliver the goods" is the order of the day, this giant of transportation takes all blue ribbons. The engine in the middle is No. 5015 of the Erie, the greatest locomotive in the world, with 24 drive wheels and 416 tons weight. It earns its daily fuel by pushing heavy trains up mountain grades in the Susquehanna district in Pennsylvania. *(© Galloway)*



Some railroad employees are smiling these days. Engineers, firemen and conductors are unaffected by the wage cut announced by the Railroad Labor Board—perhaps because the Big Four Brotherhoods are so strongly unionized. This monster—hauling Erie freight—is the largest locomotive in the world. *(© Galloway)*

"The railroad executives may be of different minds on some other aspects of the 10 per cent rate reduction ordered by the Interstate Commerce Commission, but they seem to be of only one mind when it comes to placing the sacrifices supposed to be involved. Labor and not the roads should be made to take over this burden.

"It is true that railroad wages have already been reduced from the high war level by a larger percentage than freight rates from the same level are now to be reduced. But if President Harding or the Interstate Commerce Commission had thought that this much-belated rate reduction would be accepted by the roads as evening up the score they evidently have another guess coming. It is a new score rather which has been opened, according to the roads, and an equivalent wages reduction should immediately follow.

"We are sure that the roads in this attitude do not intend to manifest an ungrateful spirit toward the Administration in its efforts to exhibit cheaper transportation as a proud accomplishment for use in the coming Congressional elections. Nothing of the sort. They are in favor of cheaper transportation so long as it costs them nothing either in present growth of net returns or prospects of greater growth. On this basis they are perfectly willing to help out the Grand Old Party at the polls. But on this basis wages must come down another notch. What the shippers are to gain, labor and not the roads should lose."

New York's other Democratic morning paper, *The Times*, does not share *The World's* sympathy with railway labor. It says:

"Opinions differ whether the reduction of railway rates will increase or decrease earnings, but there is something like unanimity that it ought to be followed by a cut in wages. That is not the view of the Labor Board of the Interstate Commerce Commission. The first thought of the commission is that the rates should suffice to supply the country with adequate service. The Labor Board thinks that wages of a public utility are a prime matter of public concern, of humanity as well as economics, and that wages should not be lowered merely to make profits. That is general practice. Wages are the first fixed charge, mechanics' liens ranking even ahead of mortgage interest or taxes. If either a public or a private concern cannot pay fair wages, it ought to stop running rather than keep alive on cut wages.

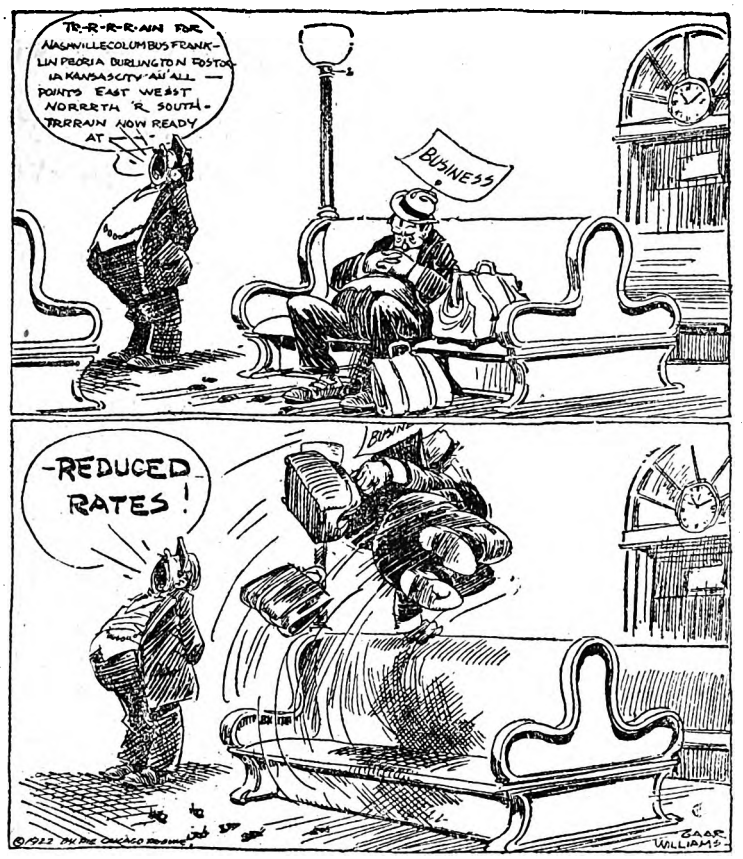
"On general principles, the transportation act should not be tinkered with until it has had a fair trial under something like normal conditions. The situation calls for peace and rest until the outlook is clearer. The next move is the Labor Board's. Its prudent course would be to make changes on considerations affecting labor alone. That is its duty under the transportation act as well as under general law and practice. The statute sets seven standards for the fixing of a fair wage. The first of them is: 'The scale of wages paid for similar kinds of work in other industries.' There is not a word in the statute about a 'living wage,' or a standard wage, or union wages. The railway workers have set up these and other extra-legal demands, on scales beyond the capacity of the industry to support. If the railways paid what the workers demand, there would result a deficit of a billion, or even more.

"Some railway wages are due for a reduction because they are out of line with those paid in other industries. That is less true of the train services than of the shop crafts. There are no comparable wages by which to try the train-service wages. They gained nothing by the "national agreement" under Government operation. Under it the wages of the unions affiliated with the Federation of Labor rose earlier and higher than those of the train services. The Labor Board has revised the "national agreement," and the railways may come to operate under the revision when it is possible to do so economically. If the board now fixes wages at the prevailing rates, and makes working conditions favorable to efficiency, it will be just to both labor and capital."

The railway unions began to hold conferences immediately after the announcement of the first wage cut. Just how much trouble may be expected from this source is problematical. Representatives of the railway executives express doubt that strikes will result. They say that public opinion is unfavorable to strikes at this time, and that the unions now have a poorer case than they had when the last railway wage cut was an-

nounced. At that time, representatives of the executives recall, the union chiefs were constrained to admit that they did not want to strike.

Moreover, only non-operating employees are expected to be involved in the wage cuts, for the present, at least. The Big Four Brotherhoods will not be asked to accept lower pay until the maintenance of way, shop and station employees have been disposed of. The reason for this is not only the strength of the organization of the Big Four, but the fact that the nature of the work they do makes their position extremely difficult to attack. The men who shovel cinders along the lines and drive rivets in the shops can be replaced, if they strike, by workers drawn from other industries, but the men who run the trains are irreplaceable. They can be trained only on railroads, and once they are trained the railroads cannot get along without them.



(© Chicago Tribune)

Perhaps This Will Rouse Him

The commission did not feel that the rate reduction would work hardship on the roads unless a wage cut followed, for it was indicated that further reductions might follow, should a wage cut be decided upon. Commissioner Eastman said in this respect:

"We have no right to assume or to conclude that wages will be or ought to be reduced. Nevertheless, these wages, which constitute the chief factor in railroad operating expenses, are now on trial, and it is at least possible that they will be reduced. If they should be, we must either re-open our proceedings and make a new determination, to the confusion of industry, or the country must forego for a time so large a reduction in freight rates as would have been possible if we had postponed our decision.

"It is my best judgment that it would have been wiser and better if we had announced several weeks ago that our decision would be deferred until after the Labor Board had acted, not for the purpose of in any way prejudging the question of wages or of influencing the action of that body, but for the purpose of so timing our own action that we might be assured that the rates which we were prescribing would be the lowest possible under the law and the rates most likely to remain stable for some considerable period of time."

In making the rate cut the commissioner expected the loss in revenue to the roads to be offset by a considerable increase in traffic, and possibly by further operating economies. The increase in traffic is generally expected to come as a result of the general business revival. The railroad executives, as well as the public, expect it to come, although they insist that it will not be speeded by the rate reduction. In their arguments at the rate hearings of the commission the roads insisted that rate cuts in the past have not resulted in traffic increases. In an attempt to demonstrate this by the citation of concrete proof, one of their witnesses testified as follows:

"The trancontinental carriers indulged in the experiment, effective March 31, 1921, of making an extensive reduction in the lumber rates out of the hope that it would result in encouraging the movement.

"On lumber originating in Pacific Coast and far Western territory the reduction to Chicago and St. Louis and territory west thereof was 7 cents per hundred pounds. This was a change from the long-haul rates without, at least for some time thereafter, any offsetting reduction in the rates from nearer competing sources of supply.

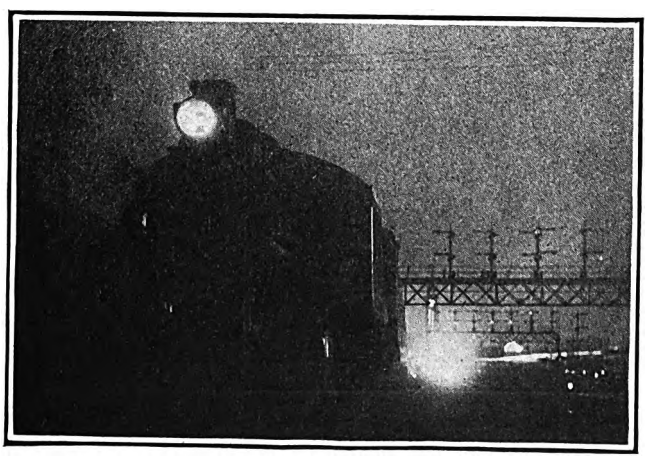
"The result of this experiment was altogether unsatisfactory. The first complete week ensuing after the freight rate reduction referred to was the week ending April 8, 1921, during which week loading was 14,631 cars. This compares with the average weekly loading for the nine weeks ending with April 1, 1921, of 16,652 cars; in other words, for the first full week after the rate reduction, instead of the business being stimulated there was a decrease as compared with the average of nine weeks previous of 2,021 cars, or of about 12%.

"Nor, it will be noted, was this week ending April 8 exceptional, because for each one of the four individual weeks, which covers the period ending with May 6, the weekly loadings were even less than for the week ending April 8.

"On this showing it may fairly be stated that if this freight rate reduction had any effect at all upon the volume of the movement it was to serve to decrease it.

"It is also interesting in this connection to recall that under normal conditions the weekly April movement is heavier than the weekly February movement, but from this particular territory during 1921 the reverse condition obtained, although the freight rate reduction was in effect during April and not during February of that year.

"When the reduction as shown did not stimulate the movement of lumber it did cause the southwestern lines, under pressure from the yellow pine lumber mills located in that section, to subsequently reduce the rates on that class of lumber to interior points in Kansas, Nebraska and Iowa, meeting in a measure the competition which had been engendered by the reduction from the Far West."



In spite of this, the roads do expect an increase in traffic. They will attribute it to the general improvement in business conditions, and not to the rate cut. As long as it comes, it makes little difference to what it is due. And the general expectation is that it will come.

The employes' unions are expected to fight the cut, but no doubt have little real hope of success.

Passing of the Twelve-Hour Day

Working hours in the steel industry have steadily decreased since 1910—other industries also show improvement

DOES a shorter work-day increase efficiency? Is a workman able, because of the relief from fatigue, to produce as much in eight hours as in twelve? These questions, long under consideration by industrial leaders, are now of timely interest, both because President Harding, at his recent dinner with the captains of the steel trade, exacted a promise to abolish the 12-hour day wherever possible, and because labor unions are continuing their pressure for shorter hours in spite of the demand of industry for increased productivity per man.

At just about the time when President Harding was holding his conference with the iron masters, the International Labor Office of Washington made public the results of a questionnaire sent to the iron and steel works of foreign countries, showing that three shifts of eight hours each are much more costly than two shifts of 12. The questionnaire, which consisted of 13 questions, with sub-divisions, was sent out by the headquarters of the International Labor Office at Geneva, Switzerland. It was printed in five languages, and was sent to governments, employers' associations and workers' organizations of 54 nations. Replies, so far, have been received from 15 countries.

The responses, as summarized in *Iron Age,* show that nearly all the foreign steel-producing countries are now operating on either a three-shift or an eight-hour day, or both, and that in consequence the number of workers has been increased by 30 to 50 per cent, with a corresponding increase in labor costs.

"Almost without exception," says the summary of the report, "it has been the policy of the iron and steel manufacturers to pay the same wages for eight-hour work as was paid heretofore for 12-hour work. *There has been no appreciable increase in output, and in certain cases the production actually has decreased both as to total and as to each worker.* This statement is based on reports from foreign governments and employers, and *while workers' organizations do not always report similiar conditions, many of them do.* The result so far has been quite surprising, in view of the claims of organized workers in all lands that reduced hours would increase the efficiency of workers and their individual output, and at the same time would mean little or no difference in cost of production."

The change from the two-shift to the three-shift day began in isolated instances as long ago as 1912, and in most countries in 1917. Since then it has been progressive. Some of the replies to the questionnaire indicate that the shorter work-day is the result of political and economic disturbances and other conditions arising from the war, and that possibly it is too early to say definitely what the change will mean.

The 12-Hour Day in Other Countries

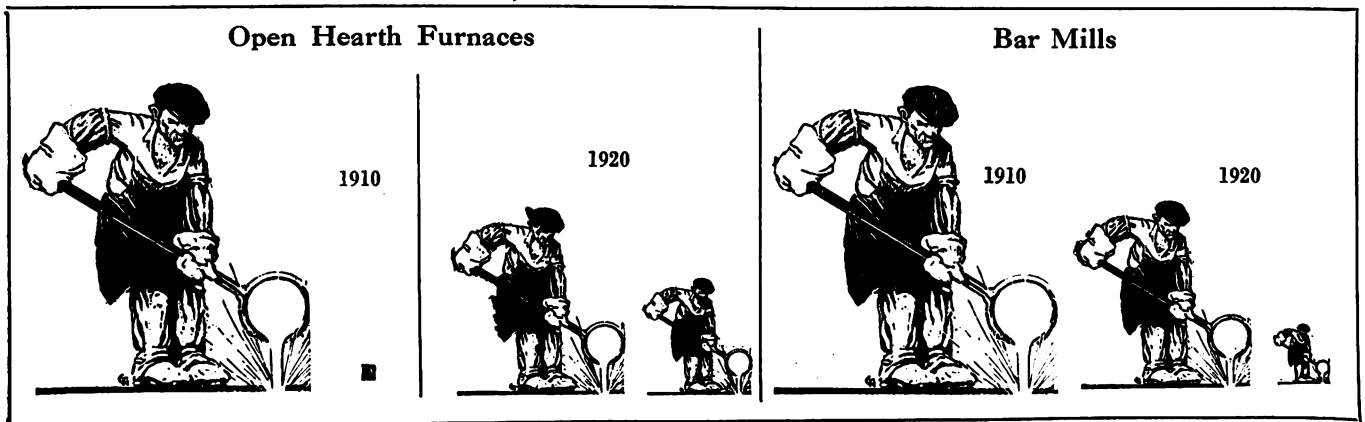
THESE nations replied to the questionnaire: Austria, Belgium, Canada, Czecho-Slovakia, Finland, Germany, Great Britain, India, Italy, Jugo-Slavia, Poland, Roumania, Spain, Sweden and Switzerland. This list includes all the important steel-producing countries except France.

The replies from Germany and Austria are the most complete. The change in these countries was made at the demand of the workers, whose dissatisfaction with long hours became most marked after the war. These unions speak well of the change, but the employers condemn it emphatically. The employers say that the shorter day has been accompanied by higher costs, inferior workmanship and lowered morale. The government reports take a middle course. In many countries the three-shift day has been established by law, and in other nations it is the result of a voluntary agreement between the unions and the employers. In some instances the employers took the initiative in establishing it.

In Austria the three-shift day entirely supplanted the two-shift day by an act of December 19, 1918, which became effective on January 8, 1919. The change was the result of an appeal by the workers immediately after the Revolution. In Belgium the three-shift day, which has been in force since the beginning of 1920, was the result of pressure by the workers. At the same time the eight-hour day was established in some of Belgium's rolling mills where the work is not continuous. In Canada, out of 15 firms operating blast furnaces, open hearth furnaces, electric furnaces and rolling mills, three are partly on the three-shift system now, and one adopted the three-shift day in 1917 but later returned to the old scheme. The remaining works are on a two-shift basis and do not expect to change. The changes in Canada were made voluntarily by the employers.

Most of the steel works in Czecho-Slovakia operate in three shifts when they are running at full capacity, but today,

Comparison of Working Hours in Steel Mills Between 1910 and 1920 Shows



*"Less than 72 hours."

because of the business depression, only a small proportion are on that basis. One shift is employed in most metal factories engaged in the later processes of manufacture. The three-shift system, however, has been adopted in the tube and plate mills and in enameling and galvanizing works. This system was introduced on Decmber 1, 1918, at the demand of the workers when the old regime collapsed.

In Finland the three-shift system was introduced early in 1918 upon the initiative of employers after the passage of an eight-hour law. In Germany three shifts had been in general use since the end of 1918 or the beginning of 1919 in all plants in which uninterrupted work is necessary. The three-shift system in Great Britain, which has displaced the two-shift system in all but a few isolated cases, became effective early in 1919 as the result of a trade-union agreement.

The eight-hour day is general throughout Italy, three shifts being used in processes which require continuous work. In many factories the change took place in 1919, and in others it was delayed until 1920. It was due chiefly to the activity of workers' organizations.

The Movement in the U. S.

IN the United States the shorter hour movement has been going on for a longer period of years. In 1910 the 12-hour day was general throughout the steel industry of this country, except in sheet and tin-plate mills, puddling mills and among the highly-skilled employes working on bessemer converters. The accompanying illustrations show the extent to which the 12-hour day has been replacing shorter and more humane working hours.

These statistics reveal that the policy of leaders in the steel trade has been to reduce the hours of labor gradually, and in such a manner as to produce a minimum of disturbance in the industry. Their acceptance of President Harding's proposal shows their willingness to continue this policy.

In other trades the movement toward a shorter work-day has proceeded more rapidly. This is especially true, of course, of industries in which labor is highly organized.

An investigation of unemployment in New York State by the State Department of Labor uncovered, incidentally, some interesting information on standard working hours. The eight-hour day, it was discovered, is the standard for the majority of workers in the State.

"In New York City three-quarters of the men and more than three-quarters of the women are employed on an eight-hour basis," says the report by Dr. Patten, chief statistician for the department. "Twenty-five per cent of both men and women have a standard 44-hour week.

"Up-State only 54 per cent of the men work an eight-hour day—usually a 44-hour week. About half the women work an eight-hour day, and half work a nine-hour day, which is the legal limit for women. Longer hours are worked by women than by men in some industries, due, obviously, not to the working of a longer day by women than by men in the same trade, but to the circumstance that the women predominate in the largely unorganized trades where hours are longer."

Working Hours in New York

THE influence of the clothing, fur, shoe and printing trades is responsible for the shorter hours in New York City, the report continues. In these industries the 44-hour week is general. The unions, generally speaking, are stronger in the city than in the up-State districts. The greater amount of time consumed in transportation to and from work is also conducive to shorter hours. The food, beverages and tobacco industries form the only large group in the city to report a working day of nine hours or longer.

Longer hours in New York State were chiefly in the stone, clay and glass, wood-manufacturing, textile and food products works. The longer hours worked by women up-State are due to the greater representation in the clothing trade, of the men's shirts and furnishings factories, which work a nine-hour day. The industries in which the eight-hour day predominates up-State are the Chemical industry, the shoe trade, pulp and paper manufacturing and printing.

"In 1913," says the report, "the nine-hour day was the prevailing working day in factories of New York State. In New York City about one-half the workers were employed nine hours a day, but more than one-third were on an eight-hour day. Up-State more than half the wage earners were on a nine-hour day, but most of the remainder were working ten hours a day or more.

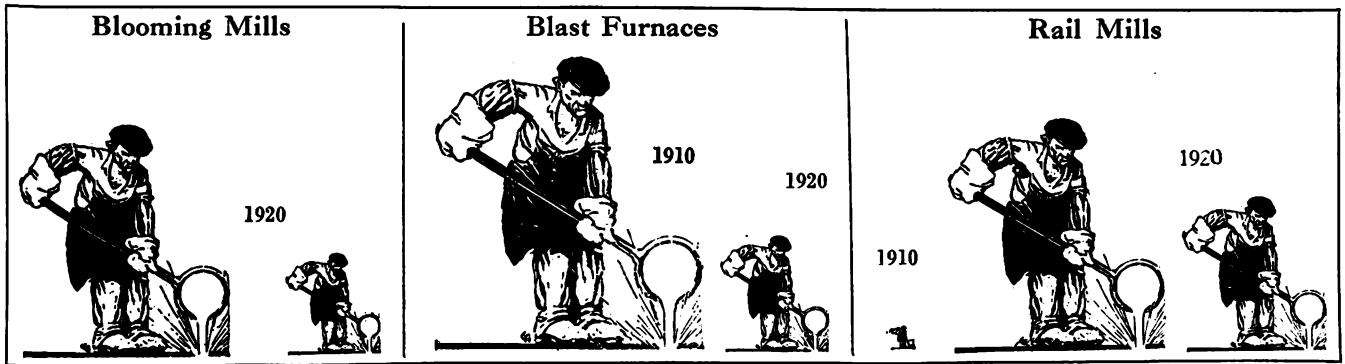
"As in 1921, the leaders in the shorter working day were the printing and the clothing trades. They were on a 48- or 54-hour week, however.

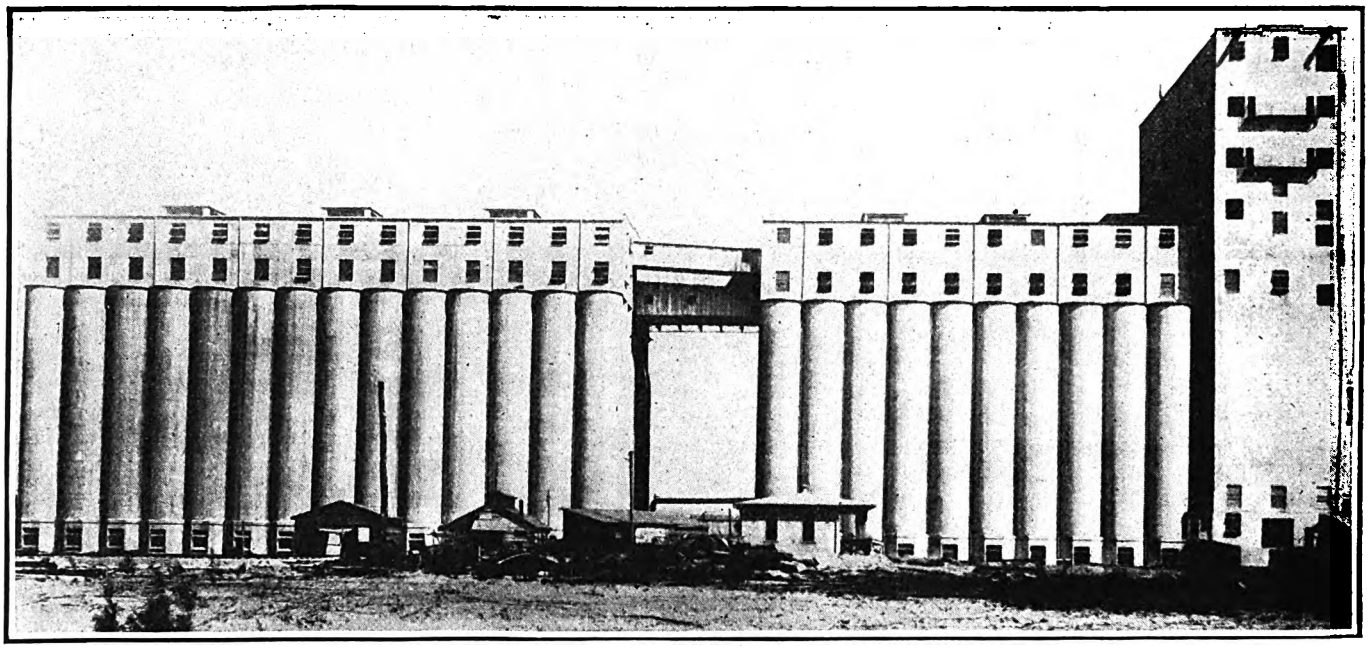
"The longest working hours in 1913 were in the stone, clay and glass, the wood-working and the food products industries, as at present, and in the pulp and paper industry. The latter reported the greatest reduction in working hours of any industry—from more than 63 in 1913 to 48 a week in 1921. The reduction is the result of the change in that industry from two-shift to three-shift operation, which changed the working day from 11, 12 or 13 hours in the continuous processes to eight hours.

"In general, the primary manufacturing industries, those in the rural districts or the one-industry towns, and those in which women are in a majority, have longer hours. The industries producing highly manufactured products, those requiring skilled men, those located in the cities and those where unions are strongest, work shorter hours.

"About 60 per cent of the employes in the metals and machinery industry work an eight-hour day. Very few work a 44-hour week. In the ship-building industry almost all of the employes work an eight-hour day. The jewelry, automobile, machinery and electrical apparatus and railway equipment industries have about three-quarters of their employes on an eight-hour basis. In the jewelry industry in New York City a 44-hour week is general. The longest hours in any industry are worked in the pig-iron and rolling mills, where all the employes up-State work more than 54 hours a week. In the instruments and appliances industries less than half the men, but 60 per cent of the women work a nine-hour day."

Trend from 12-Hour to 8-Hour Day. Relative Heights of Figures Used as Basis





The farmer feels the result of business depression as well as the manufacturer, and should co-operate in the effort to keep industrial activity on a normal basis. These great grain store houses on the Great Lakes afford one means of properly coordinating agricultural and industrial life.

How Will Prices Act Next Fall?

Conditions are ripe for a rise in practically all commodities, though it may be only temporary.

FUNDAMENTAL conditions indicate that prices of manufactured goods will rise substantially next Fall. Prophecies such as this are dangerous, for economics today is far from an exact science. THE INDUSTRIAL DIGEST, however, feels that the situation today justifies the prediction of a general upward movement in commodity prices. No pronounced rise is to be expected during the Summer, for conditions are not quite ripe, and the Summer is an off season in many industries. In the Fall, therefore, the upturn should come, if nothing unfavorable happens in the meanwhile.

It remains to be seen whether this will be a major turn of the economic tide, the forerunner of a long period of rising prices, or simply a temporary reaction. An influential school of economists believes that the general trend of prices will be downward, or stationary for a number of years. They point to the period after the Civil War, when prices continued to drop until the 1890s, and they say that the present post-war period presents analogous conditions.

This opinion may be correct, and yet the upturn next Fall may still take place. If the major trend of prices is still downward, such an upturn will be a mere temporary reaction, and after it has run its course the downward movement will be resumed. The reaction, though temporary, would nevertheless be real, and business men will not regret having been prepared for it.

But the economists who look back to the 19th century and find there a precedent for a continued fall in prices are in the minority. Most of the students of business conditions think that prices have fallen just about far enough, and that there is a good chance for the upturn to be a major movement. The *Harvard Economic Service,* whose predictions are based upon statistics analyzed by men of the highest reputation, heralded a major upward swing. It refuses to permit a temporary decline to discourage it. In one of its late May reports it says:

"The very slight decline of business in April is to be interpreted as a temporary halt in improvement and a consolidation of the substantial gains made in the two months preceding. Such movements of business are usual during periods of recovery. In the present instance, as in former cases, the fundamental conditions making for business improvement remain. The [upward] course of speculation since last summer . . . and the decline of money rates in recent months . . . indicate clearly that the slight recession of business in April should be regarded merely as a pause in a major upward swing."

This service believes that an upward movement in speculation is an almost certain precursor of a similar movement in business. In this connection it is well to remember that the New York Stock Exchange, after a period of sluggishness, resumed a considerable degree of activity in the closing days of May.

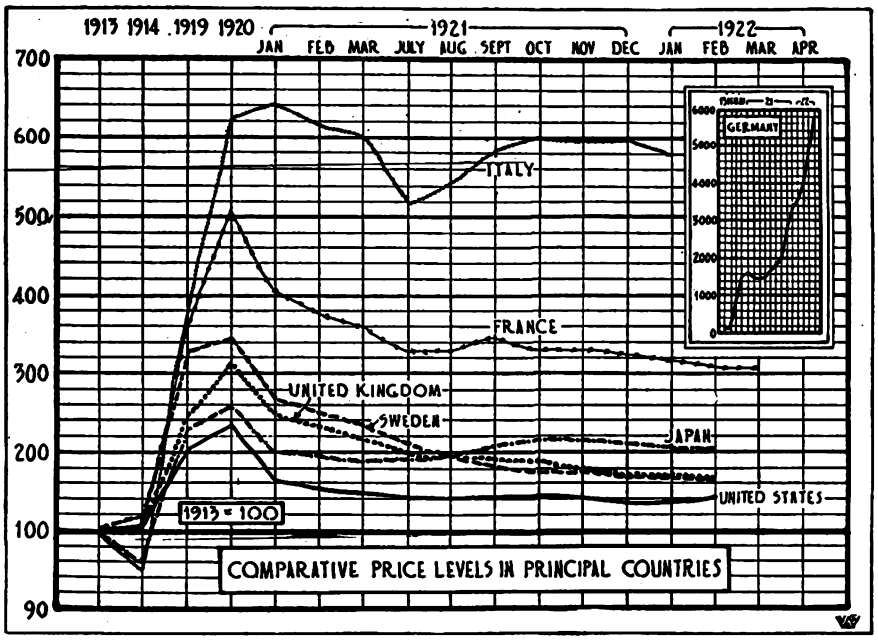
Continuing to explain the temporary drop in its index of business conditions, the *Harvard Economic Service* says:

"Bank clearings outside of New York City, which with Bradstreet's index of wholesale commodity prices form the basis of our business curve, decreased during April more than the usual seasonal amount. This decline was sufficient to overcome a substantial rise in prices, and was responsible for the slight decline in the business curve. Although the decrease in clearings was widespread, it is evident that New England, New York, the Middle West and the Pacific Coast showed as favorable returns in April as is usual in comparison with March; while the Middle Atlantic region south of New York, the South, and the Southwest showed returns much less favorable.

"The cause of the decline is to be found partly in the coal strike, as is shown both by the large losses sustained by Pittsburgh and Denver and by the fact that the Middle Atlantic States, when allowance is made for the usual seasonal movement, show the most substantial decrease of any section. A second cause, of predominant importance in many regions of the South and West, is to be found in the generally unfavorable weather conditions during April, which resulted in floods and impassable roads in many parts of the country."

In other words, the decline is due to seasonal and temporary conditions. It is a drop in activity, not in prices, and conditions in general are favorable to an upturn.

One of the most important prerequisites to an upward movement is the restoration of public buying power. There are indications that this is near at hand. The prices of farm products, except garden truck and dairy products, have been slowly rising for some months, and reports from the agricultural sections have it that the farmer feels somewhat improved. In the month of April Dun's index number of wholesale quotations showed an advance of 5.5% in breadstuffs, due chiefly to the enhanced cost of the leading cereals. Meats also rose slightly. The total increase for all foods was 1.4%, a recession in dairy and garden articles holding the total down. Breadstuffs reached the low point on November 1, when they touched an index of 22.808. Their present index is 27.558. Since this classification includes some of the principal farm products of the country, this is a favorable indication.



Comparative Price Levels in Principal Countries, 1913-1922 (1913=100).—*(The Magazine of Wall Street.)*

After the prices of farm products, the chief determinants of buying power are the wages and steadiness of employment of labor. Unemployment, except in the strike districts, is said to be considerably improved. Accurate figures are hard to get, and even the most accurate obtainable are neither up-to-date nor reliable; but certainly complaints of suffering from unemployment are less vociferous than they were a few months ago.

It seems likely, however, that wages will decline no further. Labor in most industries is liquidated about as far as it will go. A notable exception is the railroad industry, where a proposed lowering of wages carries with it the danger of trouble, but it is to be confidently hoped that the reductions will be carried into effect and the disturbances all over by Fall. Most other industries have already succeeded in effecting wage cuts beyond which further reductions seem impossible.

Export Trade a Barometer

NOT the least hopeful sign is the increased export trade. This business touched bottom in March, and has been slowly climbing ever since. The proposed high tariff, if passed, may be expected to check this movement; but a substantial sentiment for the modification of the tariff is arising throughout the country, and may result in beneficial changes before the bill is placed before President Harding. Moreover, the effect of the tariff upon exports is indirect and probably will not have time to take effect until after the fall upturn has come.

Wholesalers and retailers throughout the country with small stocks of goods on hand have refrained from extensive buying because of a fear that prices would fall still further. They are still buying cautiously. But by next fall the time will be right for a change in their mental attitude. With the first indication of a rise in prices, there will probably be a rush to lay in a supply of goods for the uphill period.

The re-entrance of the railroads into the purchasing field, a steady increase in automobile manufacture and the general improvement in business all over the country in mechanical lines, make it likely that enough workers will be employed in the large cities to maintain a steady purchasing power.

Strikes, too, will have an effect not altogether unfavorable. The coal strike will have the effect of stiffening fuel prices. The building trades disputes all over the country are adding to the cost of construction and the price of houses. The textile strike will certainly have the effect of holding up the prices of some kinds of clothing.

The Favorable Factors

THESE influences are already making their force felt. The *Harvard Economic Service,* which believes that the most favorable factor in the present situation is the broadening of the upward swing of prices, says:

"The number of commodities which show increases has expanded greatly. Dun's index of price movements for May 13 showed 76 advances—the highest number recorded since the beginning of the upswing of commodity prices—and 24 declines; the week before, advances numbered 59, and declines 18. Advances predominated generally in April, and declines in March. Of the articles making up our ten-commodity price index of cycles, cottonseed oil, coke, pig zinc, pig iron, bar iron, hides (corrected for seasonal variation), sheetings and worsted yarns were higher on May 1 than on April 1; print cloths were the same, and mess pork lower. The index, with the omission of coke because of the disturbed condition of the market, stood at 56.6 on May 1, relative to 1919 as 100, and was thus 14% above the low point of August, 1921, and at the highest level reached since that date. The textile fibers have generally advanced in price. Spot cotton on the New York market went above 20 cents per pound for middling upland on four days during the first two weeks of May. This is the highest level reached since the first part of October. Wool likewise has risen, and there is said to be considerable speculative buying. The new clip in the West is selling rapidly. Raw silk rose from $6.10 per pound on April 7 to $6.90 on May 12. Burlap prices are rising, and there is a strong demand, due to increasing consumption. The American Woolen Co. increased the prices of its woolen goods during April, and more recently has advanced its worsted goods."

So it seems that a price upturn is starting, and may be expected to get into its full stride by Fall. Whether it is a temporary reaction or a major movement matters little.

If business takes the upturn quietly and without undue speculation and inflation, its effect will doubtless be beneficial. But not all price increases are beneficial, and there is a danger that the upturn may be turned into another bubble boom. The warning is sounded and the situation admirably stated by William O. Scroggs in *The New York Evening Post,* as follows:

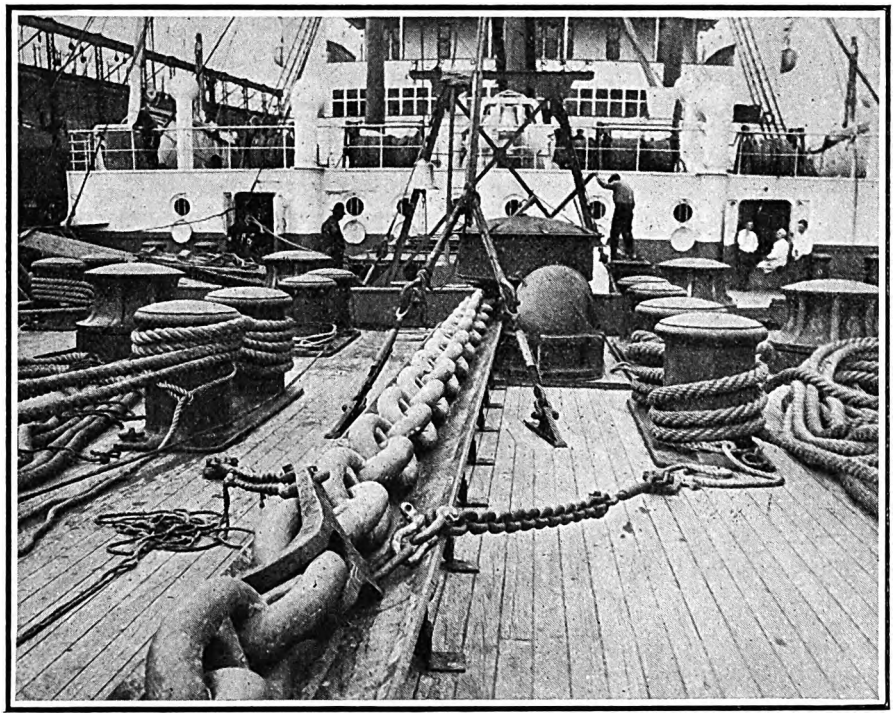
"If business men were thoroughly canvassed it is probable that a large majority of them would be found to look upon high price levels as desirable and that a large number would

(Turn to page 1108)

No Monopoly In Steel Merger

THE need for economy in the steel industry, not the desire for monopoly, appears to be the real reason for the steel merger. At present the production is in the hands of greatly diversified interests. Even if the merger goes through, the output would not be controlled by two companies alone, as the opponents of the consolidation contend. According to *Iron Age,* "The United States Steel Corporation and all the important independent companies have a total of 79% of the country's capacity. The remaining 21% is distributed among 50 companies, 30 of which have annual capacities ranging from 100,000 to 700,000 tons. It is estimated that the capacity which the (then) proposed six-company merger would have, added to that of the Steel Corporation, would total only about 16% of the total capacity of the steel companies."

Perhaps the greatest benefit to be derived from the consolidation would be the lowering of delivery costs. Shipments could be made from the nearest plant to the point of delivery so that freight charges would be materially reduced.



The Largest Chain Ever Made

The anchor chain on the liner Majestic, the world's largest ship. The links are 12 x 20 inches across, each weighing 400 pounds. In the center is the big winch on which the huge chain is wound.—*(© Galloway.)*

Since the war, bond issues have been increasing throughout the steel industry and heavy deficits have been the rule. Unless some way is found of reducing the overhead costs, there is little prospect of either profits for the producer or cheaper steel for the general public.

The need for more efficient production methods will be realized when the present demand for steel is taken into consideration. There is reported to be heavy placing of orders for plates, shapes, etc., against freight-car orders and fabricated steel jobs that have been under negotiation for some time, while there is heavy new buying by the automobile industry, which is running at a higher rate than was anticipated. The Department of Commerce reports the production in April of 196,412 passenger automobiles and 21,944 trucks. May production is running a trifle heavier.

Passenger automobiles, trucks, accessories and equipment are probably accounting for about 150,000 tons of finished rolled steel turned out in this country each month.

"Buying for a Bust"

"LOOKOUT for Jones—don't sell him on anything but a cash basis—they say he's buying for a bust!" Have you ever overheard a remark like that—and wondered what "buying for a bust" meant?

Well, this form of illicit failure became rather popular as a result of the late lamented (!) depression. The ease with which one could acquire goods by credit tempted many a merchant to expand his purchases far beyond the normal requirements of his business with the deliberate intention of first liquidating his surplus stocks at low prices and then going through bankruptcy proceedings on the best possible terms.

The reason for overbuying on the part of the merchant who plans a failure is evident, according to John L. Redmond, writing in the New York Credit Men's Association bulletin. The debtor wishes either to speedily convert the goods into cash to be secreted, or he will account for the merchandise purchased just before the failure, hoping thereby to divert investigation from other irregularities. It also enables him, in case of necessity, to offer a fair settlement to creditors at no loss to himself.

Fortunately, however, nearly every branch of industry has its special agencies that have as subscribers a large percentage of houses in the trades that such agencies are designed to serve. A wide-awake credit department will note any increased size of orders and will inquire of the agency as to the present standing of the purchaser. In the case of a first order it will be delayed until proper credit information can be obtained. By such precautions credit agencies can be made aware that a purchaser is increasing orders with his regular sources of supply, and perhaps endeavoring to open new accounts. Interested subscribers of the agency are notified to hold up orders, while the agency calls on the purchaser for a statement of his affairs with an explanation of the number of new accounts being opened.

Once the presumption of overbuying is established, there should be no hesitation to call at the debtor's place of business with a demand for further information. If the debtor's replies are evasive his larger creditors should be consulted. It is the duty of the business community, particularly the duty of credit men, first to aid the honest debtor regain his standing, and then to drive fraudulent debtors out of business.

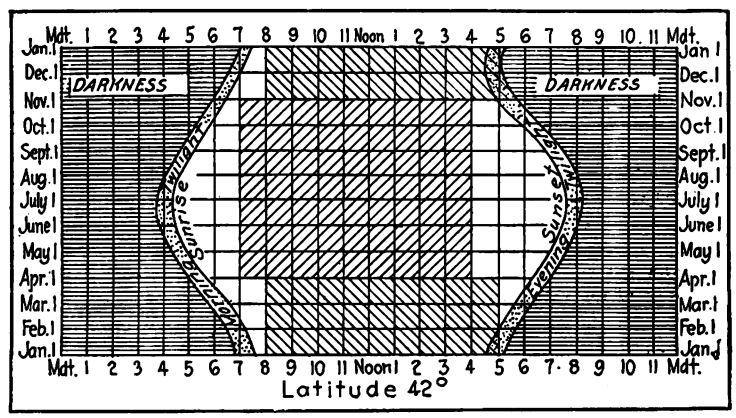
Why Workers Like Daylight Saving

Better work, less spoilage, larger piece-work earnings, lessened eye-strain and more time for recreation under the new policy

THE next time you miss a train on account of a misunderstanding as to "standard time, which is one hour earlier than time used in this timetable," just remember how many good points this much-discussed innovation has to its credit. Listen to one of the factory workers in Paterson, N. J., tell you why he voted for daylight saving in the recent poll conducted by the manufacturers to ascertain whether the new schedule was popular with their employees.

"All day long," said this man, "I work with silk—not the kind you're used to seeing, but silk in its raw state, thousands and thousands of flying and whirling 'ends' that twist and break even when handled by an experienced man. And in the summer time, with the sudden changes in the weather we have around here, there is usually more trouble in beaming the warps from the machines, and more smashing of threads in the looms, than in the cooler weather. But when you get an early morning start and know that the greater part of your day's work is going to be finished before noon, it makes a difference. Things seem to go better. Then you can count on having time enough at night, too, for working in the garden, or for a ball game. It gives you a chance to look forward to the end of the day. We like it better than the old way."

Another reason why textile workers are so much in favor of daylight saving was given by a girl weaver, an expert worker on one of the huge Jacquard looms:



Hours of sunlight and darkness along the 42nd parallel, north latitude, which passes near Salt Lake City, Omaha, Chicago, Cleveland and Boston; and in Europe, near Bordeaux and Venice. Duration of winter day, 9 hours, and of summer day, 15 hours.—(Prepared by U. S. Weather Bureau and Published in *Heating & Ventilating Magazine*.)

"I make more money since they started using daylight saving in our shop. We're paid by the yard, you know. Well, now we finish earlier in the day and it seems that I get more yards woven in eight hours than I used to. I suppose it's because I feel fresher and don't get tired so quickly."

This increased efficiency is also noticeable in other trades. In many cases productivity is increased because greater progress can be made by daylight than by artificial light. And in seasonal occupations a greater amount of work is accomplished than was the case under the old system. In the building industry, for example, where weather conditions play such an important part, the advantage of starting work early in the day is obvious.

Another important effect of daylight saving is the fact that it encourages city workers to live at some distance from their place of employment. Under the old schedule of working hours, the man who lived in the suburbs spent most of his spare daylight hours commuting. The morning was usually haunted by a fear of missing the train, and in the evening after his return from the city, darkness came so quickly that he soon became convinced that the so-called joys of suburban life existed only in the minds of people who had never tried it.

"Gardening was supposed to be one of the great attractions," said one of these disillusioned suburbanites, "but you can't carry it on very successfuly by arc-light. With daylight saving, though, it's different. It's worth while to get out in the country now, and I've made up my mind not to sell the place after all."

Daylight Saving Saves Eyes

THE diminished use of artificial light also has a beneficial effect upon the workers in factories where the work involves constant eye-strain. In all modern buildings skylights are employed whenever possible so that the maximum amount of daylight may be secured, and in many factories an effort is made to have electric light simulate daylight as nearly as possible by means of indirect lighting. But the best electric lighting system is not to be compared with daylight. And in some cases improper or insufficient lighting is said to result in inferior workmanship, damage to the equipment or machine, and sometimes even injury to the operator.

That daylight saving should be of especial interest to the people living in the cities and countries in the northern portion of the temperate zone is indicated by the accompanying diagram, showing the increasing number of daylight hours during the summer months for the latitudes farther north, as compared with the Southern latitudes, and the corresponding shortness of daylight during the Northern winter. This diagram is based on what is called "mean solar time," as the interval of time between the two successive noons constituting the solar day is not entirely uniform in length.

According to the recent census about half the population of the United States lives in the 75th meridian zone. Approximately 85 per cent of the persons employed in that zone are engaged in industrial, commercial, financial and professional pursuits—from which it would appear that working time should be adjusted to the daylight hours.

The *Heating & Ventilating Magazine* points out that the advancement of the clock half an hour in the latitude of 42° would bring the working day in winter between the sunlight hours of 7 a.m. and 4 p.m. In the latitude of 54° it would have to be advanced 1½ hours to effect the same purpose.

It is believed that the permanent advancement of time one hour in each zone of time, 75th, 90th, etc., would solve the daylight saving problem and increase the efficiency of workers in those sections where it is not now in operation.

Spain Buying U. S. Products

A REVIVING interest in American automobiles, food products and mining machinery is reported from Spain. The corn market also exhibits an increased demand for American products. The total imports of corn in February amounted to 24,000 tons, of which 4600 tons were American exports, while in March, out of a total of 13,000 tons, 5000 tons were from American sources.

Why We Need Export Trade

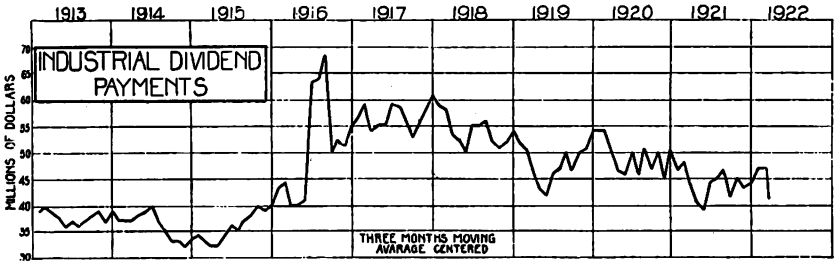
Exports form a marginal market that stabilizes prices and absorbs surplus of manufactures

HOW important is our foreign trade to the manufacturers of the United States? Can we get along without doing much of an export and import business, or is it essential to our prosperity that we take part extensively in the commerce of the world?

The question is pertinent now, because the United States Senate is considering a tariff bill which, by placing high duties on imports all along the line, will curtail America's foreign trade. By restricting imports the bill will also restrict exports, for foreign trade must work both ways.

Manufacturers who favor this tariff bill are inclined to think that our foreign trade is not of great importance. Let us keep out foreign-made goods, they say, and let us sell our own goods to our own people, thus keeping our prosperity to ourselves. Under the best possible circumstances, they say, American manufacturers ship only a small fraction of their products abroad, and it would be worth while to sacrifice this insignificant trade if we can at the same time shut out foreign competition in the home market. Other authorities, including many manufacturers, believe that this reasoning is short-sighted. They contend that America's export trade is highly necessary to her prosperity.

The President of the National Bank of Commerce of New York, speaking recently at a convention in Philadelphia, warned his auditors not to give weight to the argument that foreign trade is unimportant because it represents only 15 or 20% of the total trade of the nation.



The Trend of Dividend Payments by Industrial Corporations

Three factors influence the payment of dividends: (1) the earnings—dividends are not usually paid unless earned; (2) the financial position of the company—if ready money is needed, dividends are likely to be deferred; (3) the degree of confidence with which the directors view the future. The record shown above speaks more strongly of improved financial position and returning confidence than it does of increased earnings. A three-months' moving average has been taken in order to distribute the very heavy payments that come in January and July and to a lesser extent in April and October.—*(United Business Service.)*

"The difference between normal business conditions and depression is no more than 15 or 20% in volume," he said.

The export market provides American manufacturers with a place to sell their surplus. It is a market which they can always hold in reserve if the domestic market shows signs of weakening. If they have a foreign market for their goods they can often check a fall in prices by selling abroad rather than taking a loss at home. *This marginal market is a safety-valve which helps to prevent the accumulation of surplus stocks and a consequent depreciation in price.* Its importance was clearly shown by the fact that when it fell away in 1920, due to industrial depression abroad, industrial depression was precipitated in this country also.

Several readers of THE INDUSTRIAL DIGEST who favor the Fordney-McCumber tariff have written letters to the editor indicating that they do not see the importance of foreign trade, or the connection between imports and exports.

"I have very little sympathy with the general statement that we must let foreigners ship their merchandise into this country if we want to do any export business," writes N. F. Thompson, Jr., of the Burson Knitting Co., Rockford, Ill. "We will do export business when, and only when we can produce some article that they want at a lower price than they can produce it, or when the article is something that they cannot produce at all. When these conditions are met they will buy our product regardless of whether our tariff rates are high or low. If it were necessary to let them ship an equal quantity of manufactured good into this country in order that we may ship a quantity of manufactured goods to some foreign country, what advantage would our foreign trade be to us?"

THE INDUSTRIAL DIGEST would answer this last question by asking a question in turn: What advantage is there in selling a man goods unless he can pay for them?

A man, or a nation, can pay for its purchases only by sending in exchange something equally valuable. International payments are made by means of bills of exchange, which are balances against each other. Each bill represents a shipment of goods. When the bills on both sides do not balance (in other words, when the United States is not receiving as many dollars' worth of goods from all foreign nations as it is shipping abroad) the balance must be struck in one of two ways. Either the foreign nations must pay by shipping gold to the United States, or we must extend them credit on our books.

The United States naturally feels hesitant about extending further credit to Europe. Moreover, we do not want any more of Europe's gold. We now have more gold than we know what to do with. Gold is useful to a country today only in sufficient quantities to supply its banks and its government with an adequate reserve. Beyond that point it is an impediment.

Therefore, the only way in which Europe can pay for what we ship her is by sending us goods—not necessarily manufactures, but any kind of commodity.

Mr. Thompson says: "We will do export business when, and only when, we can produce some article that they want at a lower price than they can produce it, or when the article is something that they cannot produce at all." Will it not be to the common advantage of the United States and of foreign countries if they can buy of us articles which we produce more cheaply than they, and we in turn can buy of them goods which they can produce more cheaply than we?

That is, in a nutshell, the case for international free trade. But before that theory can be put into practice to the advantage of the United States it must be subjected to important modifications. Industries that are essential to our national independence must be protected regardless of other considerations. Other industries need protection because of their youth or because they are accustomed to tariff aid, which should not be taken away from them suddenly. The protective tariff should not be entirely dispensed with, but used with moderation and in accordance with the needs of the day, which should be determined as accurately as possible by experts.

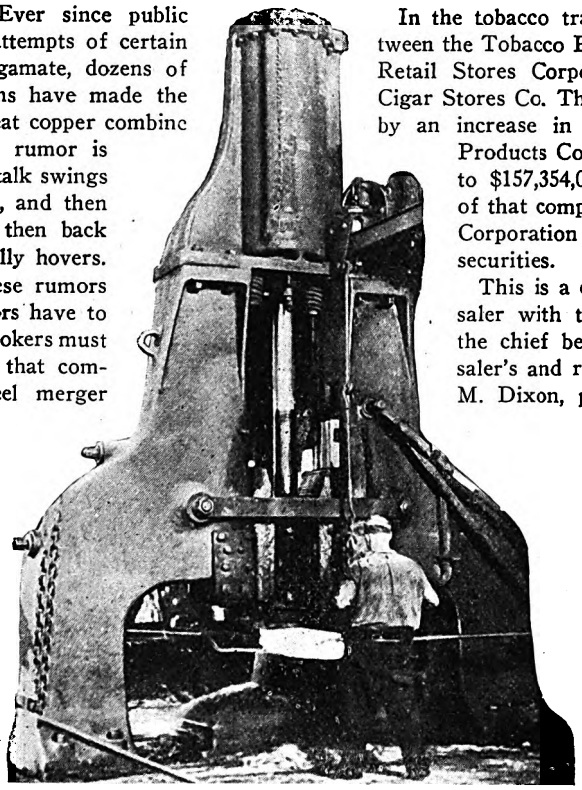
Does the Fordney-McCumber Bill meet the needs of the day? Or is it the result of political log-rolling, and will it consequently be injurious to industry?

Combinations in Pursuit of Trade

Many mergers being formed to eliminate uneconomic methods of distribution and thereby reduce costs

MERGERS, mergers, mergers. Ever since public attention was attracted to the attempts of certain independent steel companies to amalgamate, dozens of rumors about industrial consolidations have made the rounds. One day it is said that a great copper combine is being formed. The next day the rumor is about the railroads. Then the merger talk swings to oil, then to tobacco, then to sugar, and then back to tobacco, then to sugar, and then back again to steel, over which it continually hovers.

The chief stamping ground for these rumors is the Wall Street district. Speculators have to talk, or they couldn't speculate, and brokers must stimulate such conversation in order that commissions may accumulate. The steel merger rumors, of which a new variety appears almost every day, have been the basis of continual fluctuations in the stocks of independent steel corporations.



The Machinery of Production Is Far More Efficient Than the Machinery of Distribution.

But the mergers talk should not be discredited because it is Wall Street gossip. Many of the rumors are wild, and there is often no reason for believing the current versions of expected consolidations—but where there is so much smoke there is surely some fire. At least two important mergers—that of the Bethlehem Steel Corporation with the Lackawanna Steel Co.—and the Midvale, the Republic and the Inland Steel Companies have been successfully negotiated. To be sure, they came as a surprise, and partly upset another rumored consolidation; but the fact that they were actually brought to a conclusion has strengthened the general belief that mergers in other lines also will be effected.

Will the Railroads Merge?

THE most important, yet the most vague, of the merger rumors that followed the Bethlehem-Lackawanna combination is concerned with railroads. A series of great transportation combinations is said to be on the horizon, but its form is not yet clear. Much study has been given by Government officials, railroad managers, economists and bankers to the subject of railway consolidation for greater efficiency, and an elaborate plan for the creation of 19 great American railway systems has been worked out and published by the Interstate Commerce Commission. But in business the recommendations of experts are not always followed, and the railway consolidations that are coming—if they are coming—may in no way resemble these plans.

A recent decision of Federal Circuit Judge Julius M. Mayer, permitting the New York, New Haven & Hartford Railroad to elect five directors to the board of the Boston & Maine, has been hailed as an indication of a change in Federal policy toward the union of railroads through interlocking directorates. It is expected that the decision will be followed by the application of many railroad and industrial companies for modifications of decrees which, under the Wilson administration, forced their separation from allied interests.

"The time has come," said Judge Mayer in his decision, "when, in respect to the operation and control of these railways, the mental attitude should be one of construction."

In the tobacco trade a merger has been effected between the Tobacco Products Corporation and the United Retail Stores Corporation, which controls the United Cigar Stores Co. The consolidation will be accomplished by an increase in the capitalization of the Tobacco Products Corporation from $33,000,000 par value to $157,354,000 and the exchange of the stock of that company and of the United Retail Stores Corporation for the new tobacco products securities.

This is a combination of an important wholesaler with the largest retailer in its field, and the chief benefit will be the pooling of wholesaler's and retailer's profits. According to James M. Dixon, president of the Tobacco Products Corporation, the merger will enable the United Cigar Stores Co. to effect many changes in its operating methods. New blood will be injected, he said, and the expansion of the system will be continued.

The merger marks the return of James B. Duke to active participation in the tobacco business. Mr. Duke has been in comparative retirement since his resignation as president of the American Tobacco Co. in 1912, after the company had been dissolved by order of the United States Supreme Court. The new combine will be under the guidance of Mr. Duke, with whom Mr. Dixon has been associated since his boyhood.

The oil trade was concerned for a long while with a rumor that the Sinclair Oil Co. would be taken over by the Standard Oil of Indiana. Just as Wall Street had virtually settled the terms of the merger President Sinclair said the whole story was "absolutely rediculous." The Street thinks negotiations are being continued, and is talking about other oil mergers.

The steel mergers have been hitting snag after snag ever since the negotiations began. First Lackawanna deserted the group of seven independents to make a separate alliance with Bethlehem. Then the Youngstown Sheet and Tube Co. dropped out of the negotiations altogether.

After protracted negotiations, a consolidation of the Midvale Steel & Ordnance Co., the Republic Iron & Steel Co. and the Inland Steel Co. was announced. The combine will be owned by Midvale, the name of which will probably be changed to the North American Steel Co. The aggregate capitalization of the three companies is about $251,000,000. Negotiations for the inclusion of other companies in the merger are being continued, it is said.

It has been rumored in financial circles that a sixth independent—several names were mentioned—would join the remaining five. A few days later it was announced that at the request of Attorney-General Daugherty all negotiations for a merger of independents had been called off until the Department of Justice and the Federal Trade Commissions could complete their investigations. The consummation of the Bethlehem-Lackawanna merger has been postponed for the same reason.

Efficiency of Machine Tool Plants

A comparison of the "value-added-per-man" shows the marked advantage of the large plant

SOME interesting economic facts in regard to the machine-tool industry may be gained from a study of the accompanying table, compiled during the last census and recently published in the Industrial Letter of the McGraw-Hill Company. The shops of the country making machine tools have been classified in four groups according to the dollar value of their product. The number of shops in each class is listed in the second column and the total value of their product in the third. The cost of the materials used is placed in the fourth column and the fifth column is obtained by subtracting four from three.

In class 2, over $500,000 means over $500,000 and below $1,000,000. Summations are made below the first set of figures and show, among other things, that the total turnover of capital for the year is slightly less than one, 212,400,000 divided by 231,000,000, equaling 0.917, to be exact.

The fact that 80% of the product, measured in dollars, is made by 93 of the 403 shops, and that 95% is made by 277 is worth noting. Of those shops with an output of over $1,000,000 13% turn out 69% of the total output. And when the number of wage-earners in each class of shop is taken into consideration it will be observed that the bigger the shop the larger the value of the product per wage-earner employed. The same thing applies to the added value per wage-earner. The struggle for existence confronting the small shop with inferior or inadequate equipment is still further indicated by the fact that even in 1919 it produced 25% less per wage-earner employed than the average of all the shops.

Machine Tools—1919 Census — **Invested Capital $231,000,000.00**

Class by Value	Number of Shops	Value of Product	Material Cost	Value Added by Manufacturers	Number of Wage Earners	Product per Wage Earner
1—Over $1,000,000	52	$146,142,000	$38,636,000	$107,506,000	35,525	$4,100
2—Over 500,000	41	27,856,000	7,847,000	20,009,000	7,235	3,869
3—Over 100,000	134	31,760,000	10,271,000	21,849,000	8,162	3,873
4—Under 100,000	176	6,642,000	2,280,000	4,362,000	2,186	3,030
Total all classes	403	212,400,000	59,034,000	.....	53,111	4,000
80%—Class 1 and 2	93	173,988,000	46,483,000	.....	42,763	4,050
95%—Class 1, 2 and 3	227	205,758,000	56,754,000	.....	50,925	4,032

Class	Added Value per Wage Earner	Ratio Added Value to Product	Ratio Material to Product	Material per Wage Earner	Per Cent of Shops	Per Cent of Value	Per Cent of Wage Earners	Wage Earners per Shop	Product per Shop
1—	$3,029	74	26	1,071	13	69	66	683	$2,810,000
2—	2,766	71	29	1,103	10	13	14	176	679,000
3—	2,634	66	34	1,239	33	15	15	62	238,000
4—	1,946	67	33	1,084	44	3	5	12	38,000
Total	2,887	72	28	1,113	100	100	100	132	531,000
80%	2,979	73	27	1,071	23	82	80	461	1,870,000
95%	2,927	72	28	1,105	56	97	95	224	906,000

Keep Your Eye on the Coal Pile

Otherwise you may find it difficult to secure a supply when the country is fuel-starving

EVERY branch of industry is certain to be seriously handicapped if the coal strike continues through the summer. Although the effect of the suspension of work by more than 600,000 men is not fully realized by the general public, panic among the industrial consumers of coal is increasing. Stocks on hand are being rapidly depleted. Careful calculations show that while production in the non-union mines is now between 18,000,000 and 20,000,000 tons per month, the consumption is 35,000,000 and is still rising. By the middle of July it is believed the country will have no coal on hand and will be calling for at least 10,000,000 tons per month, more than all the non-union mines, working at utmost capacity, can furnish.

During the recent conference at Washington which was called for the purpose of fixing a fair price for coal during the strike, Secretary of Commerce Hoover asserted that withdrawal from stock amounted to between 3,000,000 and 3,500,000 tons a week.

"The time has arrived," Mr. Hoover said, "when the unwise virgins who did not heed my recommendations for stocking up with coal must go into the market to get it."

As time goes on more and more industrial consumers as well as the retailers of anthracite coal will be forced to go into the market. The marked increase in iron and steel orders has rapidly depleted the huge stocks accumulated in anticipation of the strike. And in many other industrial plants stocks of coal have already been consumed. When the domestic users of coal realize the seriousness of the situation and begin buying, it is predicted that a shortage of anthracite will result and that, if the expected three months' shutdown takes place, overtime work at the mines after the strike will be necessary before the colleries can resume.

The Prospects

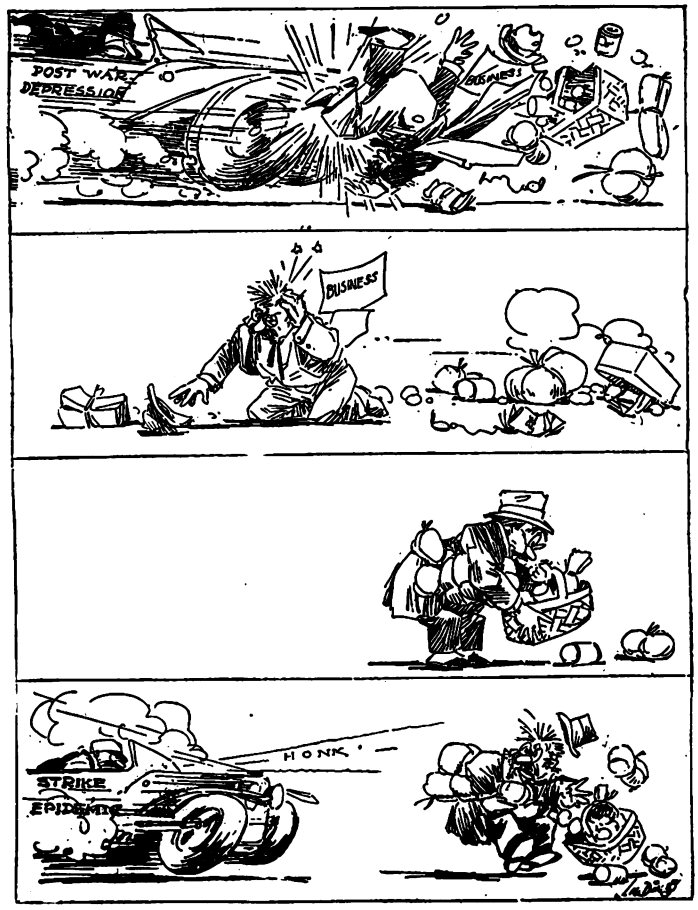
REPORTS from all Government departments indicate that a building and business boom is in prospect and that within thirty to sixty days unemployment will be reduced to normal, if the threatened coal famine can be averted. Operators of non-union mines and other operating mines, who have been in consultation with Secretary Hoover, assert that they can probably deliver 6,000,000 tons or more of coal each week and so avert a crisis. This amount, even in addition to the coal in storage, will not meet the estimated requirements if general business activities continue to advance on the present scale.

Strike leaders have announced that the miners are prepared to stay out all summer, if necessary, in order to win the strike, and that the union has made tremendous inroads in the non-union fields, many thousands of unorganized men having gone out with the union men and joined the United Mine Workers of America. It is also predicted that a new strike order, calling from the mines the 8000 maintenance men who have remained on duty since the suspension on April 1, may be issued, if the operators and miners do not reach an agreement in the very near future.

Commenting on the effect of the strike upon the coal market, *Coal Age* says:

"With the Lackawanna Railroad taking smokeless coal from southern West Virginia by barge from Hampton Roads, unloading the barges in New York Harbor into open-top cars for railroad fuel west to Buffalo, and with the reverse of this, the Pennsylvania Railroad taking smokeless coal off the Norfolk and Western, west and north to Columbus and then east to Manhattan transfer, one has a picture of the topsy-turvy conditions of the market in the East. The liveliest market centers in New York City and extends south to Baltimore. Except for water-borne coal from Hampton Roads, there is little tonnage available in these markets, and the inland buyer, who is not readily served by tide-water delivery, is becoming panicky. There are not many coal consumers in the market in this area, but the prices they have to pay for coal are increasing every day.

"For the coal from the one real source of supply, southern West Virginia, West Virginia and eastern Kentucky, the Atlantic seaboard is bidding against the steel industry and the West. Spread over the whole market is the beginning of heavy buying by the railroads. Chicago is leaning heavily on western Kentucky, a union field operating under a contract that runs throughout this year. . . . Demand for fuel for some steel plants on Lake Erie is moving coal in such volume from Toledo to Buffalo that boat rates have been marked up. It is reported that steel manufacturers at Sandusky have bought coal at Duluth and will ship it down. Canadian railroads are buying coal off the Duluth docks to be delivered by boat."



(Kansas City Star)

No Wonder the Old Boy Has a Nervous Disposition

Millions Going Up in Smoke

DO you remember the story of the man who made a fortune in Pittsburgh laundering window curtains? The more smoke in the Pittsburgh atmosphere, the more curtains to be laundered. But his successors in the business will not make so much money if the coal-burning industries follow the suggestion of the Government and college experts working on the problem at the University of Illinois.

These authorities assert that by employing a specially devised low-temperature process it is possible to convert many supposedly non-cokable coals into coke. If this could be accomplished it would not only solve the smoke nuisance but at the same time result in the recovery of valuable by-products of ammonia gas and tar which have been going to waste. In the opinion of H. O. Loebell, of New York, chairman of the industrial fuel committee of the American Gas Association, there is a likelihood of gas entering all competitive fuel markets with its possible complete utilization for heating purposes by all industries of the nation. "If either (of these productions) is right," says *Commercial Fertilizer*, "then the day approaches when sulphate of ammonia will be a by-product of about all the coal that is mined in this country. This will mean considerable sulphate of ammonia."

The experiments conducted by the University of Illinois were undertaken in connection with an investigation by the Bureau of Mines of the smoke problem at Salt Lake City. It was found that coke was regularly obtained from only a few coals tributary to the Salt Lake City district, and that if the use of coke, a smokeless fuel, was to be increased in that city it would be necessary to demonstrate the possibilities of coking coal not regularly used for that purpose. Six coals from various Utah districts were tested, although so far as present standards of coking indications are concerned, the coals tested seem quite non-coking. However, treatment by the methods devised by Professor S. W. Park, of the University of Illinois, is said to have resulted in a yield of good coke amounting to approximately 60% of the coal used. This coke is dense and of good texture and seems adapted to use as a domestic fuel and for metallurgical purposes. Slightly more than 20 lbs. of ammonium sulphate valuable as fertilizer were recovered per ton of coal coked.

The gas recovered as a by-product is especially suitable for utilization in city mains. And it is believed that the tar oils obtained will lend themselves readily to cracking processes, thus furnishing a product suitable for motor fuel purposes. These tar oils, on account of their exceptional drying properties, may also be available for paint and varnish manufacture. Other uses are suggested, such as direct combustion in engines of the Diesel type, as fuel for steam generation, as a source of heat for metallurgical purposes, the carbureting of water gas and as the source of pitch as a binder for the briquetting of lignite fuels, etc.

The report of the American Gas Association predicted that the gas industry will become the country's largest public service institution, and further asserted that gas companies must prepare themselves for a gigantic building program such as will permit them to take on $1,000,000,000 of new business resulting from the task of providing heat for American homes and for industry. Complete disuse of solid fuel in cities and consequent elimination of smoke and grime were declared by the committee to be probable accomplishments in the near future.

THE TREND
—in facts and figures

Financial

Bank Clearings	Week Ending June 3	Week Ending May 27	Year Ago
New York	$4,318,839,625	$4,167,291,310	$3,595,806,359
Chicago	562,716,185	520,585,939	450,819,990
Entire Country..	7,422,000,000	7,288,000,000	6,260,000,000
Increase or Decr.	+18.6%	+10.7%	—19.7%

(Per cent of total from preceding year)

Cost of Money—New York	Week End. June 3	Week End. May 27	Year to Date	Year Ago
Call Loans	5½@4	5@3½	6@3	8@7
Time Loans (60-90 days)	4¼@4	4¼@4	5@4	7@6½
Six Months	4½@4	4½@4¼	5@4¼	7¼@6¾
Com. Discount,4-6mos	4¾@4¼	4¾@4¼	5@4¼	7@6¾

Financial Transactions	Week Ending June 3	Week Ending May 27	Year Ago
Stock Sales, shares.....	6,222,699*	6,771,956	2,565,262
Aver. Price, 25 Railroads ..	64.60 h. 62.60 l.	64.22 h. 62.81 l.	53.74h. 53.15 l.
Aver. Price, 25 Industrials.	99.27 h. 97.87 l.	98.39 h 96.62 l.	82.61 h. 81.22 l.
Sales of Bonds, Par Value..	$67,294,500	$84,149,425	$62,174,600
Aver. Price, 40 Bonds.....	80.18 h. 80.04 l.	80.38 h. 80.14 l.	69.32 h. 68.96 l.
Average Net Yield, 10 High-Grade Bonds	4.622%	4.63%	5.455%

New Security Issues	$59,349,000	$77,385,560	$40,000,000

*Five-day week.

Business Failures	Week End. June 1	Week End. May 25	Year Ago
Number.....	407	451	264
	April, 1922	Four Months	April, 1921
Liabilities..	$73,058,637	$291,071,002	$13,224,135

Industrial

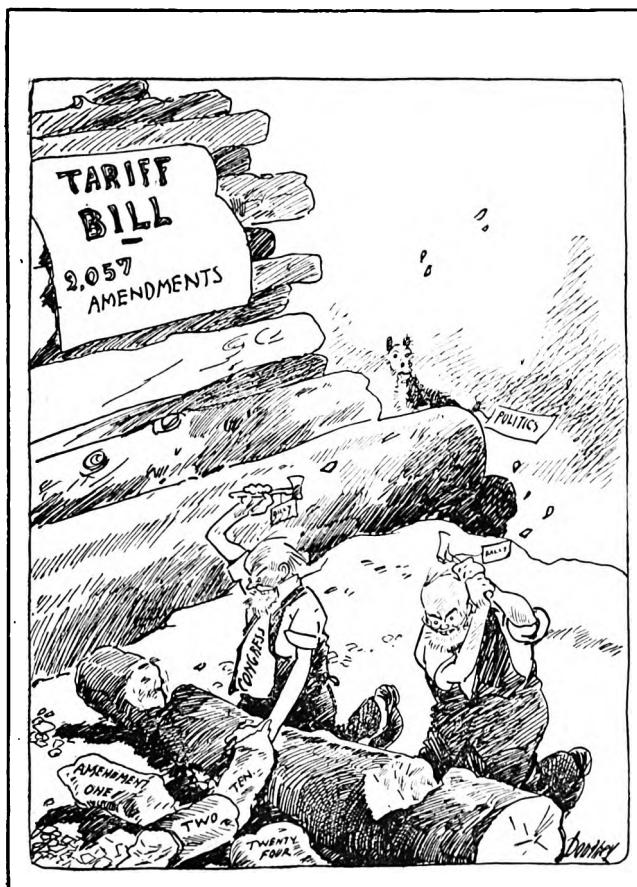
Building Permits (142 cities)	April, 1922 $192,184,353	February, 1922 $132,909,067*	April, 1921 $112,373,483

*161 cities.

Idle Freight Cars	April 29, 1922	April 22, 1922	March 22, 1922
Number	540,046	540,272	380,434
Car Loadings	May 20, 1922	May 13, 1922	April 15, 1922
Number	792,459	777,359	706,713
Steel and Iron Barometer	April 30, 1922	March 31, 1922	April 30, 1921
U. S. Steel Orders (tons)	5,096,917	4,494,148	5,845,224
Daily Pig Iron (Prod.) tons ..	69,070	65,631	39,768
Monthly Pig Iron (Prod.) tons...	*2,072,114	†2,034,794	*1,193,041

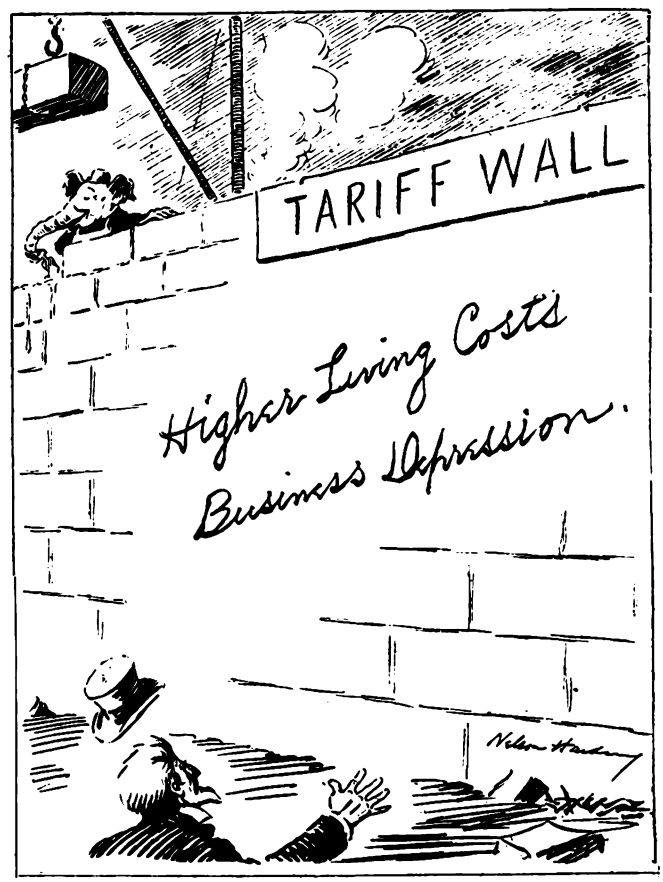
*Month of April. †Month of March.

Foreign Trade	March, 1922	April 1, 1922	March, 1921
Exports	$332,000,000	$862,000,000	$386,680,346
Imports	258.000.000	691,000,000	251,969,241



(Cleveland Plain-Dealer)

Gosh, how the chips do fly!



(Brooklyn Daily Eagle)

The handwriting on the wall.

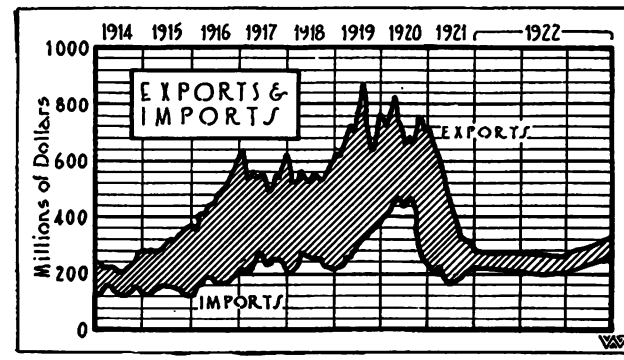
Basic Commodity Prices

(Minimum, at New York, unless otherwise specified)

	Week Ending June 3	Week Ending May 27	Year Ago
Aluminum, pig (ton lots), lb.	.17	.17	.225
Antimony, ordinary, lb.	.0525	.0525	.0575
Brick, Hudson R., per M.	20.00	22.00	15.00
Cement, Portland, bbl.	1.70	1.70	2.15
Copper, Electrolytic, lb.	.13875	.1375	.13125
Cotton, spot, Mid. Upl., lb.	.21	.215	.1295
Hides, Chic. Pack., No. 1, lb.	.16	.15	.14
Lead, N. Y., lb.	.057	.0575	.0495
Petroleum, cr., at well, bbl.	3.25	3.25	3.00
Pig iron, Bessemer, Pgh., ton	26.96	26.96	25.96
Pine, roofers 6 in., M. ft.	28.50	28.50	29.00
Rubber, Up River, fine, lb.	.18	.18	.165
Silks, Sinshui, No. 1, lb.	7.50	7.40	5.75
Spelter, N. Y., lb.	.056	.055	.05
Steel Billets, Bess., Phg., ton	35.00	35.00	37.00
Tin, N. Y., lb.	.315	.3125	.3125
Wool, Dom., ¼ blood com., lb.	.45	.43	.31

Wholesale Commodity Prices

Coal—			
Bit., ¾ in., lump, net ton	...	...	...
Anthracite, egg, net ton	7.75	7.75	...
Coke, furnace, net ton	6.00	6.00	3.25
Cotton Goods—			
Brown Sheetings, Std. yd.	.1175	.1175	.095
Standard Prints, yd.	.1025	.1025	.11
Print Cloths, 38½ in., 64x60, yd.	.0825	.08125	.06375
Drugs and Chemicals—			
Alcohol, ethyl, form 5, gal.	.30	.30	.37
Alcohol, wood, 95%, gal.	.57	.57	85
Alum, lump, lb.	.0375	.0375	.04
Bleaching Powder, over 34%, 100 lbs.	1.60	1.60	2.35
Borax, crystal, in bbl., lb.	.06	.06	.06
Caustic Soda, 76%, 100 lbs.	3.75	3.75	3.70
Lime, factory, 200-lb. bbl.	1.90	1.90	...
Nitric Acid, 42°, lb.	.065	.065	.0725
Saltpeter, crystal, 100 lbs.	.0875	.0875	...
Soda Ash, 58% light, 100 lbs.	1.80	1.80	2.00
Sulphuric Acid, 60%, 100 lbs.	.50	.60	.60
Flour—			
Spring Pat., 196 lbs.	7.65	7.85	9.00
Winter, soft str't, 100 lbs.	6.00	6.10	7.25
Grains—			
Wheat, No. 2 Red, bu.	1.32	1.3425	1.82
Corn, No. 2 Yellow, bu.	.7925	.79375	.87875
Oats, No. 3 White, bu.	.48	.48	.51
Rye, No. 2, bu.	1.11	1.15	1.715
Barley, malting, bu.	.775	.78	.71
Hay, No. 1, 100 lbs.	1.60	1.60	1.40
Straw, lg., rye, No. 2, 100 lbs.	1.75	1.75	1.30
Hides—			
Cows, heavy native, lb.	.135	.135	.10
Country, No. 1 steers, lb.	.10	.095	.09
Iron and Steel—			
Basic, Valley furnace, ton	25.00	25.00	21.75
Steel bars, Pittsburgh, 100 lbs.	1.60	1.60	2.10
Beams, Pittsburgh, 100 lbs.	1.60	1.60	2.20
Galvanized Sheets, No. 28, Pittsburgh, 100 lbs.	4.15	4.15	5.00
Leather—			
Hemlock, sole, No. 1, lb.	.20	.20	.28
Scoured oak backs, No. 1, lb.	.45	.45	.55
Lumber—			
FAS Qtd. Wh. Oak, 4/4" M. ft.	145.00	145.00	145.00
Tonawanda Wh. Pine No. 1 barn 1x4", M. ft.	82.00	82.00	90.00
Adirondack Spruce, 2x4", M. ft.	38.00	38.00	54.00
No. 1 Com. Y. Pine Bds., 1x4", M. ft.	41.00	41.00	37.00
Oils—			
Coconut, spot N. Y., lb.	.09	.09	.1125
Crude, tks, f.o.b. coast, lb.	.0725	.075	.0825
China Wood, bbls., spot, lb.	.1325	.135	.15
Cottonseed, lb.	.1225	.1225	.07
Linseed, city, raw, gal.	.93	.93	.78
Parafine wax, ref., 125 m. p., lb.	.035	.035	.04
Turpentine, gal.	.995	.98	.61
Paints—			
White Lead, in oil, lb.	.1225	.1225	.13
White Lead, dry, lb.	.07	.07	.075
Zinc, Amer., lb.	.075	.075	.0875
Paper—			
News roll, 100 lbs.	3.50	3.50	4.25
Book SS. & C., lb.	.0625	.0625	.09
Wood Pulp, ton	75.00	75.00	100.00
Sugar—			
Cent. 96°, 100 lbs.	4.23	4.23	5.06
Fine Gran., in bbls., 100 lbs.	5.50	5.50	6.35
Wool—			
Boston Aver. 98 quot., lb.	.7144	.6776	.4092
Stand. Clay Wor., 16-oz., yd.	2.80	2.80	2.85
Fancy Cassimere, 13-oz., yd.	2.30	2.30	2.125
Serge, 36", Wor., yd.	.50	.50	.52
Broadcloth, 54", yd.	2.50	2.50	2.50
Cottonwarp serge, 36", yd.	.45	.45	.45



U. S. Exports and Imports, 1914-1922.—*(The Magazine of Wall Street.)*

Cotton Condition 69.6% Normal

ACCORDING to first report of condition of the cotton crop in the United States for this year, given out last week by the Department of Agriculture, the condition on May 25 was 69.6 per cent of normal compared with 66.0 last year, 62.4 in 1920, 75.16 in 1919, and 82.3 in 1918.

The condition of the cotton crop in the United States monthly and the estimated yield per acre are given below:

Years:	May 25	June 25	July 25	Aug. 25	Sept. 25
1922	69.6	....	....	....	....
1921	66.0	69.2	64.7	49.3	42.2
1920	62.4	70.7	74.1	67.5	59.1
1919	75.6	70.0	67.1	61.4	54.4
1918	82.3	85.8	73.6	55.7	54.4
1917	69.5	70.3	70.3	67.8	60.4

Condition of the crop on May 25 by States, with comparisons, follows:

	1922	1921	1920	Ten-year average
Virginia	91	77	71	83
North Carolina	84	65	70	77
South Carolina	67	58	68	72
Georgia	71	63	55	72
Alabama	80	57	58	72
Mississippi	75	60	65	76
Louisiana	70	57	72	75
Texas	61	71	60	76
Arkansas	76	70	61	76
Tennessee	79	69	60	76
Oklahoma	67	74	70	77
United States	69.6	66.0	62.4	74.6

Cotton acreage and yield per acre 1921 by principal States (revised estimates):

	Acres picked, 1921	Yield lint per acre, pounds
North Carolina	1,403,000	264
South Carolina	2,571,000	140
Georgia	4,172,000	90
Florida	65,000	80
Alabama	2,235,000	124
Mississippi	2,628,000	148
Louisiana	1,168,000	114
Texas	10,745,000	98
Arkansas	2,382,000	160
Tennessee	634,000	228
Oklahoma	2,206,000	104
United States	30,509,000	124.5

Hamburg's Tonnage Exceeds Figures of 1913

According to statistics just issued the tonnage of the shipping entering and leaving the port of Hamburg last month exceeded that of May, 1913, the year before the war.

Last month 1,143 vessels of 243,815,000 net tons arrived, as compared with 1,242 vessels of 193,526,000 tons in May, 1913. Sailings totalled 1,469, of 375,000,000 tons, as compared with 1,362 vessels, of 253,987,000 tons.

Railroad Freight Car Figures

		April, 1922	March, 1922	April, 1921
Surplus:				
Box	number	94,653	88,491	178,037
Coal	"	235,077	72,566	229,443
Total	"	371,538	206,746	492,352
Shortage:				
Box	"	369	255	87
Coal	"	374	77	108
Total	"	842	423	276
Car loadings:				
Total	cars	727,488	827,400	698,156
Grain and grain products	"	32,874	41,184	33,455
Livestock	"	27,114	18,092	26,993
Coal	"	72,528	131,116	131,314
Forest products	"	56,052	52,731	47,578
Ore	"	9,654	5,250	5,730
Merchandise and miscell'eous	"	521,106	495,258	448,422



New Issues Slacken

THE bond market during the closing fortnight of May "continued to suffer from indigestion," as the financial editor of *The New York Tribune* put it. Brokers still had securities on their shelves left over from old offerings, and new financing was slackened to permit the market to complete the process of absorption. In the week ending May 27 the total offerings fell short of the $100,000,000 average which had been maintained since the first of the year. Negotiations for numerous new issues were being conducted, but were slow to mature. Bond prices on the stock exchange held firm, in spite of a tendency of money rates to harden.

Public Utility Bonds

PUBLIC utility bonds had their turn as the leaders of the new offerings. Six new blocks of securities of this type, at prices to yield from 5.15 to 6.75%, were brought out by investment bankers during the week ending May 27.

Technical Position Stronger

THE stock market showed a tendency to react easily to favorable news. Apparently its technical position was corrected by the declines in the first part of May, and the way has been cleared for the continuation of the bull market. The averages for the month are as follows:

	20 INDUS.	Chge.	20 R.R.'S	Chge.
May 1	93.35	+ .61	84.45	+ .02
May 2	93.64	+ .29	84.34	— .11
May 3	93.81	+ .17	84.44	+ .10
May 4	93.18	— .63	84.40	— .04
May 5	93.18	.00	84.68	+ .28
May 6	93.59	+ .41	84.65	— .03
May 8	92.84	— .75	84.30	— .35
May 9	92.57	— .27	83.98	— .32
May 10	91.58	— .99	83.13	— .85
May 11	91.50	— .08	83.12	— .01
May 12	92.50	+1.00	83.44	+ .32
May 13	92.93	+ .43	83.90	+ .46
May 15	92.08	— .85	83.58	— .32
May 16	92.63	+ .55	83.34	— .24
May 17	93.71	+1.08	84.00	+ .66
May 18	93.91	+ .20	84.41	+ .41
May 19	94.80	+ .89	85.28	+ .87
May 20	94.65	— .15	86.13	+ .85
May 22	94.86	+ .21	86.17	+ .04
May 23	94.66	— .20	86.12	— .05
May 24	94.70	+ .04	85.94	— .18
May 25	94.36	— .34	85.66	— .28
May 26	95.05	+ .69	86.33	+ .67
May 27	95.47	+ .42	86.66	+ .33
May 29	96.41	+ .94	86.83	+ .17
May 31	95.61	— .80	85.54	—1.29

It will be observed that the brief downward reaction ended quite definitely in the middle of the month, and the daily change thereafter, with few exceptions, was upward. During the month the industrials rose from 93.35 to 95.61 and the rails from 84.45 to 85.54. The rails soon recovered the fractional losses they registered upon the announcement of the 10% rate reduction.

Rail Stocks in Demand

THE strength of the railway stocks, in spite of the rate order, is due to a combination of factors, according to the *Boston News Bureau:*

"If the reduction in rates is translated into retail prices, it will enable the public to increase its purchases, which will make more work for manufacturers, increase movement of raw material to manufacturing plant and the shipment of finished product therefrom. Increased efficiency on the part of the men is also playing its part in reducing costs.

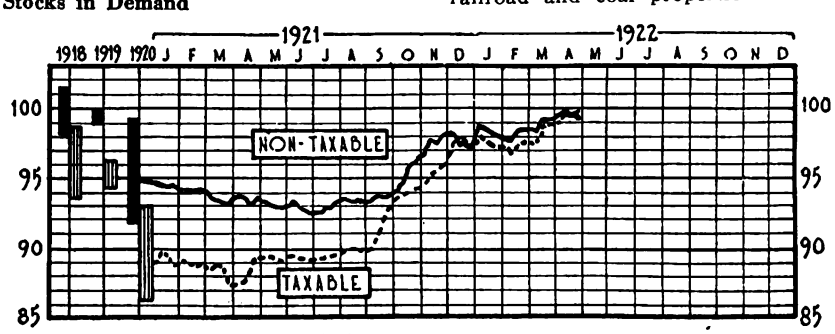
"One of the significant developments of the past few days is the report from Washington that President Harding is considering asking Congress to amend the Transportation Act, one of the changes being to remove seat of the Railroad Labor Board from Chicago to Washington. Evidently the Administration believes there should be closer co-operation and co-ordination of efforts between the Commerce Commission, as the rate-making body, and the Railroad Labor Board, as the wage-fixing tribunal. Action of the Commerce Commission in ordering a reduction in rates before the Labor Board announces its decision in the wage cases seems like putting the cart before the horse; but there is every reason to expect that the Labor Board will order some reduction in wage rates which will offset the cut in revenues that will follow freight rate reductions.

"The money market is another factor which is having a salutary effect upon the railroad market; and there are some investors who believe that with continuing easy money the time is not far distant when seasoned dividend-paying railroad stocks will be selling on a basis to yield little more than 5%. As many standard rails are selling today at prices to yield better than 6%, a decrease in yield to a 5% level would mean an increase in price of 20 points or more.

"Expectation of consolidations is also a contributory factor in the present rail market. No date has been set for hearings by the Commerce Commission on the subject; but consolidations will be made on paper from time to time, with bullish effect, particularly on the lower-priced issues. Railroad men point out that the consolidations as provided under the Transportation Act are not mandatory, and managers of the stronger system question whether the situation will be strengthened by addition of "weak sisters" to strong ones. Big systems, like the Pennsylvania and the New York Central, have been proceeding for some time in consolidating their systems internally and thereby reducing the number of different corporations embraced in the system, and so lessening expenses by consolidation of departments and elimination of reports."

The April report of 137 of the 201 Class 1 railroads shows net operating incomes amounting to $35,239,000, compared with $21,886,000 for the same roads in April(1921. The railroads scored this substantial increase in net income in spite of the fact that their total operating revenues were only $297,300,000, a decrease of 4.6% from the record of the previous year. Total operating expenses were $240,533,000.

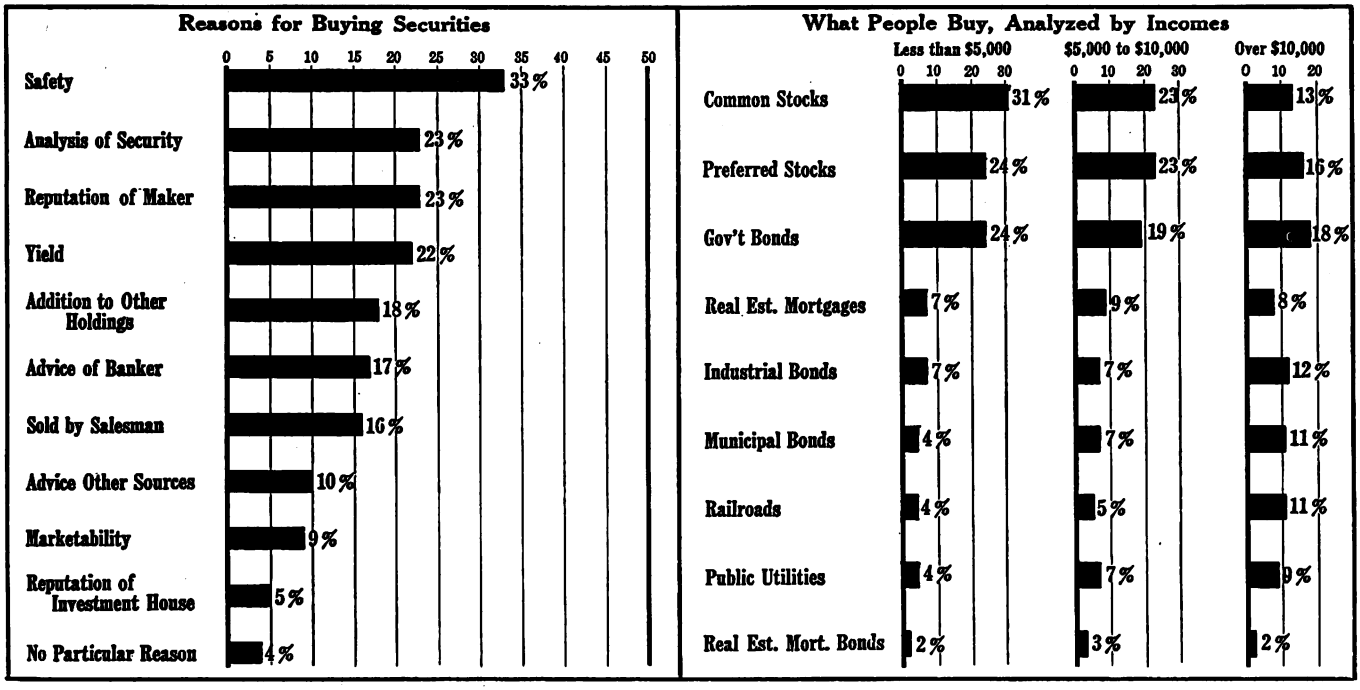
The reports of car loadings are also a source of some encouragement to railway investors. Loadings of revenue freight for the week ending May 20 totaled 792,459 cars, an increase of 15,100 cars compared with the preceding week and 21,468 more than the corresponding week of 1921. The May 20 figure was 69,615 less than that of 1920.



U. S. Government Bond Averages.—*(Magazine of Wall Street.)*

Good News for Reading Stockholders

BY a decision of the Supreme Court, rendered by Chief Justice Taft, the holders of preferred stock in Reading railroad and coal properties will benefit through the equal distribution with the common stock of the surplus of past years in excess of dividends. The Chief Justice said that the rights of the common and preferred stockholders are to be determined by the organization agreement of 1896. Each share of stock, whether common or preferred, had



A view of what people buy and why. Perhaps the "no particular reason" is the nourishment of bucket shops.—From figures by Albert Frank & Co.

a vote. The agreement provided that the preferred stock should be entitled to non-cumulative dividends. The decision directs the District Court to ascertain values of the Reading properties and to divide lien and interest charges of the general mortgage between new companies in proportion to such values.

Financing Mexico

ADOLFO DE LA HUERTA, Secretary of the Treasury of Mexico, arrived in New York on Memorial Day for a series of conferences with American bankers. He expressed confidence that an amicable arrangement would be made. The conferences were to deal with the Mexican Government's financial obligations, the government railways and the oil industry.

The external bonds of Mexico, on which it is hoped to start payment soon, as a result of agreements to be reached by the conference, have been in default since 1914. The bankers expect Mexico to devote to this payment a fund of $6,000,000, which was paid to the Mexican government in tax adjustments by American oil corporations. The bankers have let it be known that they do not expect the whole obligation to be discharged at once. Their objective at the conference, it is said, will be the payment of a moderate first instalment to be distributed among holders of the defaulted coupons, and reasonable guaranties that the balance will be paid and future interest payments made when due.

Mexico is credibly reported to be seeking a substantial loan in this country to help her to regain her feet. It is fairly safe to say that she will not get it unless she can satisfy the bankers' requirements as to her outstanding obligations.

Farm Bloc Wins Out

THE House of Representatives has passed the bill, approved several months ago by the Senate, providing for the appointment of an additional member of the Federal Reserve Board to represent agricultural interests. The farm politicians succeeded in taking this step in spite of the opposition of the Secretary of the Treasury, the Governor of the Federal Reserve Board and all others who resent the further intrusion of politics upon business.

Before passing the bill the House rejected amendments proposed by the House Banking and Currency Committee, which struck out the provision for enlarging the Board and merely directed the President to have due regard in making appointments for the representation of agriculture. The bill as passed provides that in selecting the six appointive members of the Board "the President shall have due regard to a fair representation of the financial, agricultural, industrial and commercial interests and geographical divisions of the country. Not more than one may be appointed from any Federal Reserve District."

Passage of the bill in this form may enable W. P. G. Harding, governor of the Board, to continue in office after his present term expires in August. It had been expected, if the Board were not to be enlarged, that President Harding would name a Republican acceptable to the farmers in place of Governor Harding. Since a new place has been provided for the "dirt farmer," this step will be unnecessary. It is noteworthy that in spite of this fact Governor Harding opposed the bill as passed.

More Foreign Investments

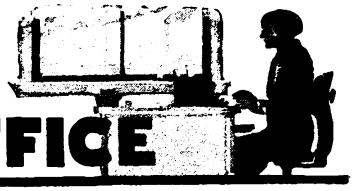
MORE and more people appear to be reaching the conclusion that the investment abroad of America's surplus capital offers at once an attractive opportunity and a solution of the problem of our economic relations with Europe. We must export capital before Europe can pay her debts to us and conduct an extensive trade with the United States.

"The possibilities of foreign investment fall into two general classes," says *Barron's Weekly*. "We may either lend our money abroad or we may participate directly in the risks and profits of foreign industrial, mining and public service enterprises. These two broad fields may again be sub-divided. We may confine our loans to foreign governments or we may make loans to foreign business organizations. We may participate in foreign business either through the extension of the activities of American corporations to foreign fields, through the organization of investment trusts after the British model or through the direct purchase of stock in foreign corporations. Finally we may combine the functions of lenders and entrepreneurs by purchasing bonds of new enterprises with common stock bonuses. . . .

"It is possible for Americans to co-operate for foreign investment on a generous scale with minimum risk through the medium of investment trusts, carefully organized and competently managed. Here is a virgin field for American initiative."



IN THE MANAGER'S OFFICE



Developing a Planning Department

CHARLES T. SIMPSON, in *100% Management,* outlines the development of a planning department which increased production at lower unit costs, reduced the overhead and relieved foremen of clerical and follow-up work. The planning department originates all manufacturing orders and material requisitions and assigns jobs in accordance with its schedule. Orders are sent from the sales department direct to the planning office, where material requisitions are made out and a progress record started for each job. This record shows the customer's name, information concerning the order such as size, quantity, date ordered, promised and completion dates and the details of the material requisition. Job tickets for each operation are prepared at the same time and are placed with the progress record in a pocket on the job control board.

On this board a system of colored pegs shows graphically work ahead, work assigned or in process and work finished. This is shown with reference to operations only. A separate board shows the jobs in process and as assigned to each operator. Each department in the factory is provided with an assignment board which has three pockets opposite every operator's name. When a job is sent from the planning office to the factory a messenger takes the job tickets from the job control board and distributes them to the department boards. When an operator finishes a job he punches his ticket on the clock and drops it in the "finished" box, taking the next assignment from one of the pockets on the assignment board. Two messengers make trips every half hour to collect the finished job tickets and correct the control boards.

When an order is first received from the sales department, a request for materials is sent to the stockroom, where the materials are assembled for delivery to the proper departments for the delivery of materials at the proper place and time, so that operators are not kept waiting for stock.

Committee Control of Costs and Profits

CONTROLLING costs and establishing profit margins by committees representing the entire organization is advocated by *Industrial Management.* The primary functions of the committees are: The analysis of manufacturing costs and expenses; detailed waste surveys in assigned processes; budget control and revision; suggestions for specific cost cutting.

The work is done by a central or coordinating committee controlling the activities of five general committees on men, methods, machinery, materials and money. These committees are further subdivided to study problems in their respective fields. The coordinating and general committees are made up of officers, major and minor executives and key men. Individual members of the entire personnel are drawn upon as temporary members of the various sub-committees and are urged to bring forward suggestions and constructive criticism regarding the work of any sub-committee.

The money committee first makes a study of expenditures to segregate those items of expense which are considered promising fields for effort toward economy. The high spots are thus determined. The Committee then reports its findings and recommendations to the coordinating committee, which in the meantime has listed the weak spots. The correlation of high spots and weak spots determines the work of the other committees.

The next step is to sell the plan to the organization as a whole, and this is the function of the committee on men. The plan is explained so that every member of the organization realizes that it will work to his personal advantage in permanency, full-time employment, good wages and better working conditions.

The remaining general committees—methods, machinery and materials—make surveys, receive suggestions and make recommendations on technical features of the manufacturing process. Each member of the technical sub-committees discusses the problems of his committee with as many members of the organization as possible. Current technical publications are used for ideas as to how other concerns handle the same problem. Every step in the manufacture is questioned as to its necessity and after its necessity is established the efficiency is determined.

Computing Bonus Payments

A METHOD of computing bonus earnings and direct labor costs under the group bonus plan is described by E. K. Wennerlund in *100% Management.* Each group is designated by a number or symbol which is used by the cost department as the operation number. The personnel of a group may change without affecting the group symbol. A shop routing sheet is prepared for each part or assembly on which work is done by the factory and shows all the detail operations with their standard times. The detail operations are combined into group operations. A copy of the shop routing sheet is furnished the cost department. Group operations then become the basis for computing direct labor costs.

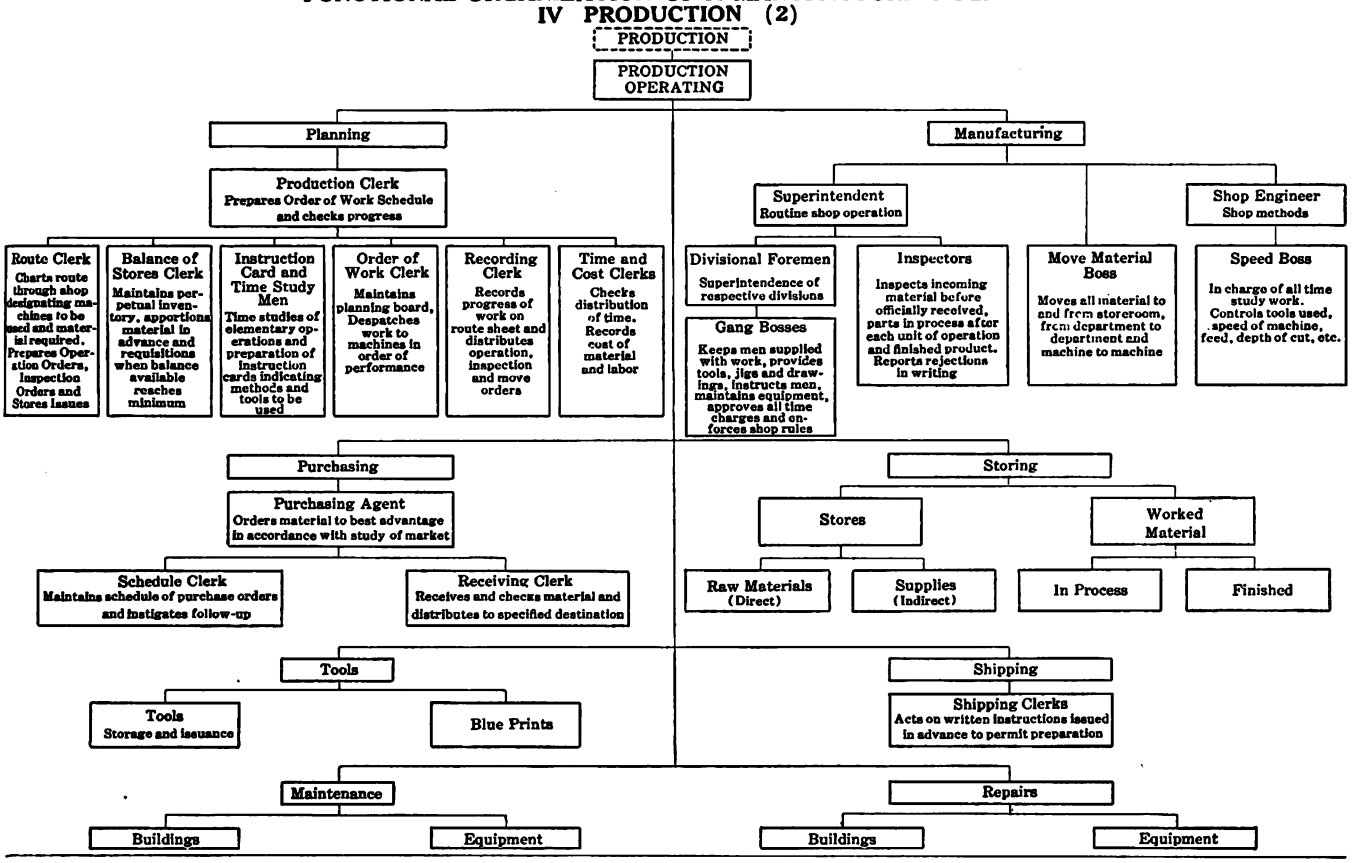
The shop check turns in daily the list of clock numbers of employees assigned to each group, showing the actual number of hours each employee worked in the group. These hours are taken from the entrance clock cards. If an employee is transferred from one group to another during the day, a transfer slip is made out by the foreman and time charged accordingly. The total clock hours each day per department must balance with group hours plus any individual job tickets. These hours are entered daily by the bonus clerk under clock numbers. Credits are summarized from inspection slips and given to the bonus clerk.

At the close of the pay period the total hours for each employee are added and multiplied by the base rate to give the amount on which the bonus is computed. The ratio of standard hours to actual hours measures the group efficiency. Direct labor cost of the group operation is obtained by dividing the total cost of the group by the total number of pieces credited. The total cost of the group divided by total standard hours gives the cost per standard hour.

Job tickets or elapsed time checks on different parts are not required, nor is it necessary to check up quantities if an employee leaves early or is absent. Bonus is computed from the average efficiency attained by the group during the pay period.

An Executive Formula

MEASURING the apparently intangible quality of executive ability by mathematical formulæ is proposed by Wm. E. Dunn in *Industrial Management.* The basis of the method is the contention that action may be measured in terms of its effects or results. Three factors in the measurement of executive ability are given. (1) The ratio of the amount of results accomplished to the time required in performance is the rate of production. (2) The value of the results divided by the costs of production gives the rate of increase in value. (3) The ratio of the product of the difficulties encountered to the sum of the means available for use is the "measure of the situation." The product of (1), (2) and (3) is the index of executive ability.



Functions of a Typical Industrial Plant

This chart is fourth in a series based on lectures given at the Bureau of Personnel Administration by Warren D. Bruner.

Some explanation is necessary as to how these expressions are obtained. Value of results, costs and means available (resources, assets and capital) are measured in terms of money. In the measurement of difficulties Mr. Dunn proposes a scale of difficulties based on job analyses, the difficulty of a job being inversely as the percentage of candidates who are able to attain the standard performance. If 50% of the candidates are successful the difficulty is 2, and so on.

Why Do Salesmen Fail?

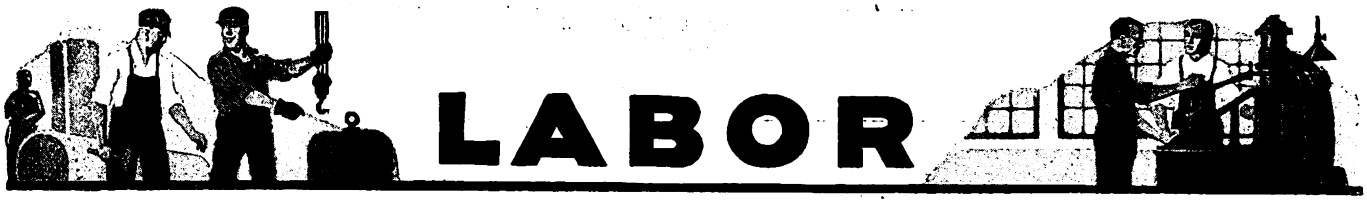
WRITING from the buyer's viewpoint, E. E. Shumaker, in *The Purchasing Agent,* analyzes the factors which may be responsible for lack of success in selling. (1) A purchasing agent cannot buy from every salesman that calls. (2) The reputation of the company is often the deciding factor regardless of the qualities of the salesman. (3) Many organizations have established sources of supply for every important article and rarely change without good reason. (4) Sales campaigns are often directed at firms which do not have use for the article. A carefully planned prospect list will eliminate this feature. (5) In establishing new sources of supply the salesman himself is a very important factor and should be a good advertisement of the firm he represents. (6) A firm is not entirely judged by its representative, but a bad impression is created if the salesman is not a good advertisement.

Cheaper Handling of Stores

STORES are money and to prevent waste the handling of stores should be centralized and carefully controlled. The functions of a good stores system are: (1) To know what stock is needed for the prompt and efficient management of a business; (2) To know where each and every item of stock is, so it can be promptly obtained with a minimum of cost for getting it out of stores and into use, and to keep absolute control of it while in process of manufacture; (3) To have stock on hand when it is needed, and to provide a means to automatically replenish stock getting low before it is entirely exhausted; (4) To know the amount required for the prompt and economical running of jobs and the fulfillment of the orders; (5) To prevent tying up of material, labor and its share of overhead expense in too large quantities; (6) To know that a correct balance is kept, so that stores on hand at the end of one month, plus that purchased that month for stock, minus that drawn out the same month, exactly equals the balance found to be on hand at the end of that month; (7) To know that all material used (with a minimum of waste) has been properly charged to an expense or job, and the stores account credited; (8) To give an exact record of the consumption of each item for any period, where each lot was obtained, when, in what quantities, the whole cost, or correct inventory valuation of it, and for what each piece was used; (9) To keep a perpetual stores ledger up to date, showing the unit balance (either piece, pound, foot, or other unit of measure) and a correct inventory value for the quantity on hand at that date; (10) To insure and maintain the accuracy of the stores ledger perpetual inventory, including the automatic checking of the same, both by classes as well as for each item each time stock is ordered to replenish a depleted supply.

New Paint Primer for Wood

FROM German sources comes the report that a solution of casein in sal ammoniac will give a primer that can be used to good advantage in painting all sorts of wooden surfaces, even the most porous. The primer will fill up the pores of the wood completely in one coat and the paint can be applied right over it after it has dried to give a smooth, even film. The ease of preparation and the cheapness of the primer recommend it for wide application.



The Railroad Wage Cut

THE announcement by the Railway Labor Board of the wage cut for maintenance-of-way men was the outstanding feature of the last fortnight. The opinion of labor publications seems to be that the cut, which is to be the first of a series affecting all railway employees, was intended to pass on the recent rate cut of the Interstate Commerce Commission to the workers. Consensus of newspaper opinion seems to be that the wage cut was in large part deserved and comes at a particularly fortunate time.

The officials of the maintenance-of-way employees' and railway shop laborers' unions have begun plans for a strike vote among the 478,000 members of the unions and approximately 75,000 non-union men who would be affected by any walkout in protest of the wage cut. The cut will have the effect of reducing the wages of maintenance men from one to five cents an hour, depending upon the degree of skill required in the work.

Labor publications point out that the Interstate Commerce Commission had explicitly stated that no wage cuts were taken into consideration when the 10% horizontal rate reduction was decided upon and that further rate reduction might follow any announcement of a wage decrease.

It is generally understood that decisions affecting the wage scale of shopmen, clerks, station men and train service men will follow at an early date.

The effect of the wage cut has been chiefly to reassure railroad executives and holders of rail securities and at the same time to stir up animosity on the part of the unions affected. Railroad officials emphasize the fact that public opinion at this time would be very strongly against any protest of the wage reduction and express the opinion that no trouble will be forthcoming from the union.

Labor publications are strenuously opposed to the policy of the Railway Labor Board in handing down decisions affecting only one group at a time—a method which consists in practice of "singling out one man in a crowd and knocking him down." The claim is made that sufficient time elapses between one wage reduction and the next to permit any organized opposition to the decision to burn itself out without harm.

A meeting of the sixteen railroad brotherhoods and executives of other railroad organizations will be held in Cincinnati to consider the wage reductions which are contemplated by the Labor Board.

Textile Strike Shows Improvement

THE textile strike in New England shows considerable improvement. A Federal conciliator is operating in New Hampshire and is meeting with considerable success. Strikers in Somersworth, N. H., have notified the State Labor Commission that they would accept its recommendations laid down at a joint conference of mill owners and workers. These recommendations were that the strike be declared off; that employees be reinstated without prejudice or discrimination; that the working time for women and for minors under 18 years be 48 hours per week; that all wage reductions be submitted to a board of arbitration; that the decision of the board be accepted without further discussion; and that the decision should be retroactive to the time employees returned to work.

A legislative committee will probably be appointed in Massachusetts to deal with the Lawrence situation. No improvement is recorded in Rhode Island and the strike is increasing in bitterness, with injunctions and counter-injunctions crowding the horizon.

If a definite settlement should be reached in the New Hampshire mills it will immediately be made the basis for a working

How the Hearst Papers View the Labor Situation



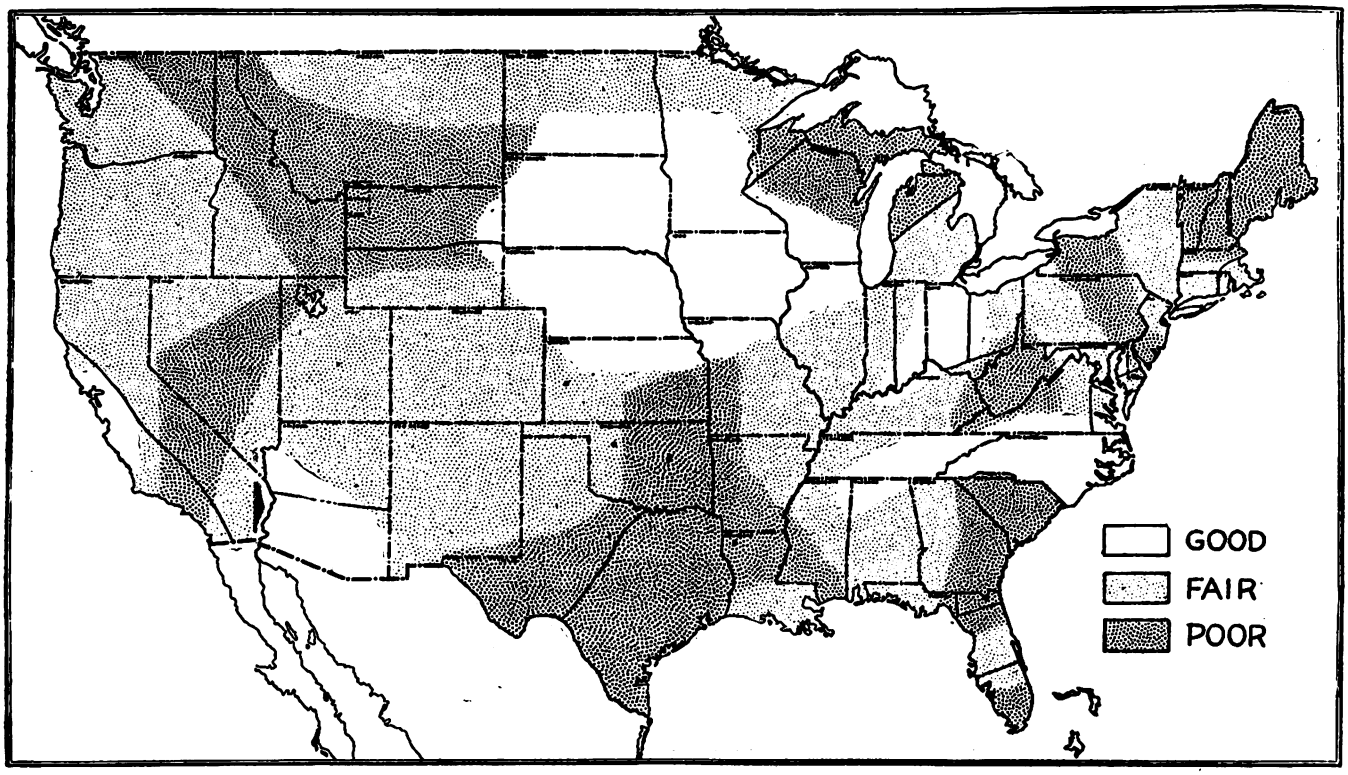
(New York American)

It's Surely Coming



(New York American)

One More Move and It Is Finished



Engineering Employment Conditions in Various Parts of the United States

Based on a survey in 200 widely separated localities. The most important factor in engineering employment is the apparent attainment of a much greater degree of economic adjustment and stability. The situation is far more promising than any that has prevailed for some time. The demand for architectural designers, structural draftsmen and designers, with building experience, far exceeds the supply in the Central West. Salaries for men of this class of work have increased very materially. There are a few positions opening up for construction engineers and superintendents.

agreement in the Rhode Island and Massachusetts mills and the strike will be practically over.

Skilled Labor in Demand

THE *National Industrial Conference Board* reports that the shortage of skilled labor is increasing. In Boston, New York and New Jersey the shortage is confined for the most part to building trades. In Chicago, Detroit and other Middle-Western cities it is not limited to any one industry, but is said to apply generally. At various coast ports seamen are especially in demand, and the opening of the navigation season on the Great Lakes has influenced the movement of longshoremen from coast ports to the Lakes. According to the Weekly Survey issued by the *National Industrial Conference Board,* "Thousands of idle men are being taken on at iron mines in Michigan; these mines have been closed for a year, but some are now operating with full crews day and night. The agricultural industry, the building trades and the iron, and steel, automotive and railway car construction industries are steadily increasing in activity and are influencing conditions in industries connected with them.

"Better employment conditions are being reflected in materially diminished wage reductions and in increasing reports of wage advances. A summary of wage changes during the last month, prepared by the *National Industrial Conference Board,* shows that in the clothing industry wage reductions are on the increase, that in the building trades the number of cases of reductions is one-third lower than during the previous month, that in the granite industry a 20% reduction has been accepted and a strike ended, and that in a few cases attempts to reduce wages have failed."

Cost of Living Stabilized

THE cost of living in the United States, as a whole, has not changed, according to the *National Industrial Conference Board's* recent investigations, which show that "on April 15, 1922, the cost of living was 54.8% above what it was in July, 1914. This represents an increase of less than one-tenth of 1% since March 15, 1922. The only change in the entire budget within the month was a slight increase in clothing prices which had an insignificant effect on the budget as a whole. Dealers are of the opinion that there will be little or no change in clothing prices within the next few months and real estate operators report the same regarding house rents. The future price of coal for domestic use is said to depend largely on the outcome of the present strike in both the anthacite and bituminous fields."

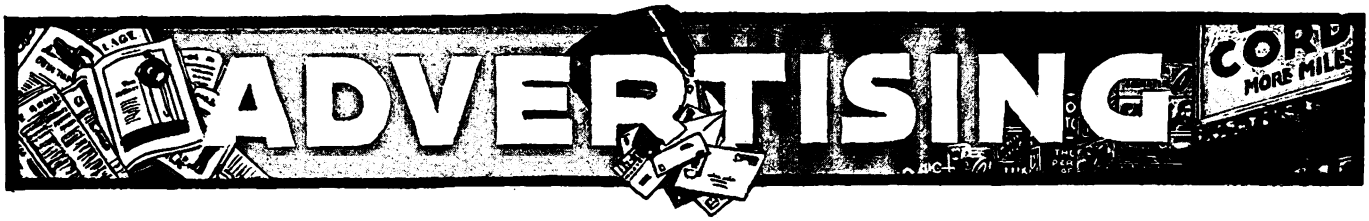
Employment Increases by Trades

ACCORDING to a report of the *United States Bureau of Labor Statistics,* four industries show an increase in the number of persons employed, and eight a decrease in April, 1922, compared with March, 1922. Industries which show an increase in employment are: iron and steel, 6.8%; automobile manufacture, 6.3%; car building and repairing, 0.2%; and hosiery and underwear, 0.1%. Decreases were shown for cotton finishing, 15.1%; men's clothing, 10.1%; silk manufacturing, 9.5%; boots and shoes, 5.7%; paper making, 5.6%; cigar manufacturing, 5.3%; leather manufacturing, 2.7%; and cotton manufacturing, 2.0%.

Benefits of the Five-Day Week

ALTHOUGH the five-day week, recently put into operation by Henry Ford, is not new, having been previously adopted by the Clothcraft Shops in Cleveland, Ford's plan is found to have a number of advantages resulting from its use. Chief among these are the saving of power—the same output in 10% less time; reduction in absence and labor turnover; new sources of labor—women coming in for five days who could not for six; more balanced production.

Of 40 firms, in shoes, textiles, rubber and metals, that have tried the five-day week, the majority have reported favorably.



Use Color to Make Your Letters Pull

WHEN a salesman makes his call, his success depends entirely upon his ability to find the vulnerable point of his buyer—the point to which the appeal can be made with the greatest chance of success. And James H. Rothschild, writing in *Forbes Magazine,* points out that modern letter-writers are working along the same lines as the salesman. As the result of carefully conducted tests it has been found that letters on certain colors of stock make for quicker action than others.

In a recent test 12,000 letters were sent out—1000 each of twelve letters. The same copy was used in each case, the only difference being in its "dress" and the color of the stock used. The total was divided into four territorial groups—North, South, East and West. Six of the letters were illustrated with cuts and six were not. All were made up and signed on the multigraph, but each was filled in by typewriter to match.

As a result of the tests it was found that a letter on plain white stock, with a conventional letterhead, pulled 9%, while the same text on pink stock with two little line cuts pulled 48%. Table I shows you just which colors are most popular, while Table II shows you the duration of pull of the various letters. It should be noted that nearly 46% out of the 48% total replies received to letter No. 12 came in two weeks, whereas letter No. 1 took five weeks to reach 9%.

Table I

Results of Color Test

Letter No.	Quantity	Color	Cuts	Color Ret. Envelopes	Pull P.C.
1	1000	White	No	White	9
2	1000	White	No	Blue	12
3	1000	White	Yes	White	18
4	1000	White	Yes	Blue	22
5	1000	Corn	No	White	14
6	1000	Corn	Yes	Blue	26
7	1000	Green	No	White	16
8	1000	Green	Yes	Blue	28
9	1000	Gold	No	White	21
10	1000	Gold	Yes	Blue	34
11	1000	Pink	No	White	26
12	1000	Pink	Yes	Blue	48

Table II

Duration of Pull

No.	1st Week	2d Week	3d Week	4th Week	5th Week	Total	Total P.C.
1	18	32	21	11	8	90	9
2	20	37	36	15	12	120	12
3	66	61	34	9	8	178	18
4	54	78	58	21	6	217	22
5	34	53	39	11	2	139	14
6	61	141	43	12	3	260	26
7	86	67	..	6	..	159	16
8	90	164	22	5	2	283	28
9	72	131	5	3	..	211	21
10	65	258	13	2	1	339	34
11	58	193	7	..	2	260	26
12	63	407	8	1	1	480	48

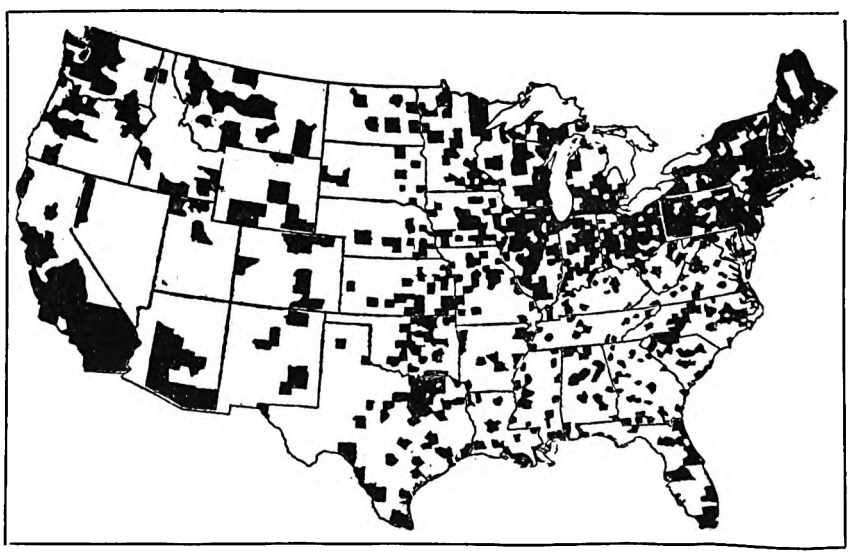
Relative "Pulling Power" of Colored Paper Stock in Advertising Matter. ***(Forbes Magazine.)***

How Much Do Women Buy?

ACCORDING to Herbert N. Casson, women buy 76% of all the merchandise in the shops. They spend three times as much money as men do, for they buy for themselves, for the children, for the home, and to quite an extent for the men of the family.

The percentage of certain goods bought by women is silks 95%, books 85%, toilet goods 95%, jewelry 90%, glass and china 75%, leather goods 65%, pianos 75%, phonographs 60%.

But in spite of the fact that women are the purchasers of such a large portion of merchandise, it is pointed out that in all the mass of instructions on how to write effective advertising copy, little consideration is given to the woman's viewpoint, and that among the many books on advertising there is not a single manual devoted to the best method of appealing to the woman buyer.



Enormous Field Open to Mail-Order Houses

Mail-order houses do a large business in communities of as high as 25,000 population. In the map above, the black spaces represent those sections of States in which are counties containing towns of 5,000 or over. Assuming that mail-order concerns must look to strictly rural communities for the bulk of their business, the white area shows the enormous extent of the territory which they can serve, especially in the Mississippi River Valley.—*(N. Y. Evening Post.)*

How Industry Can Avoid Summer Depression

IN the opinion of Edward Eyre Hunt, writing in *Printers' Ink,* seasonable employment, like the cyclical movement over seven-to-ten-year periods, is controllable within certain limits. It is believed that miscalculation of demand, more than anything else, intensifies the upward and downward movements of business. Intensive analysis of markets and extra sales efforts must be started today if summer is not to slow down the momentum business has already gained.

If every manufacturer would start in tomorrow to study his sales in terms of volume, and then use the money he is spending for sales effort to control the volume intelligently during the period just ahead, it would help materially to a better business, instead of the usual summer slump.

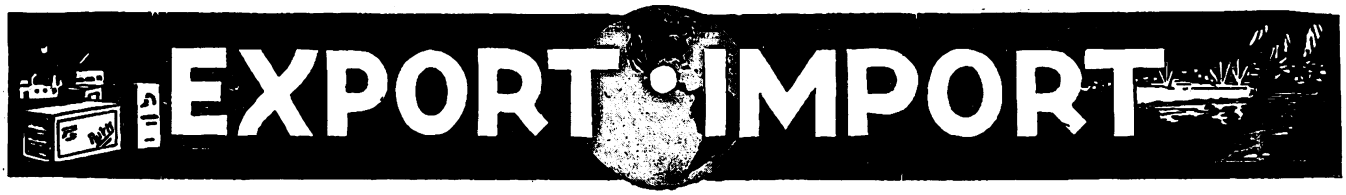
Testing Mail Order Advertising

ONE of the greatest advantages in using mail-order advertising, says Verneur Edmund Pratt in *The Mailbag,* is that it can be quickly tested. In a few days or a week after mailing one can begin to tell whether it is going to pay or not. All mail-order plans may be tested in one of the following ways:

(1) By testing one city, county or State, and from the results obtained in this one spot computing probable results from big mailing.

(2) By testing a small mailing scattered over the entire territory and computing results from large mailing.

(3) By testing either one piece of merchandise or a small group of articles and from the results computing the returns from a full showing.



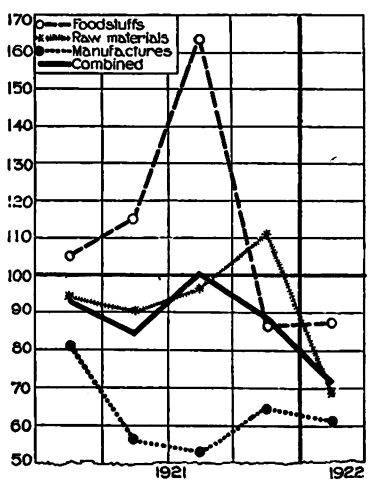
Export Prospects Brighter

THE effect of the anticipated consummation of a German loan has been reflected in the remarkable improvement of European exchange and particularly in the strengthening of sterling and of marks, the former reaching $4.46, the highest since mid-July of 1919, and the latter rising to 38/100ths of a cent. The fact that the German Government submitted to the terms laid down by the Reparations Commission, and that France accepted the submission of Germany as satisfactory, is likely to have a tremendous effect not only upon conditions abroad, but upon the export trade of the United States, since the rise in exchange will make American goods easier to sell in foreign markets.

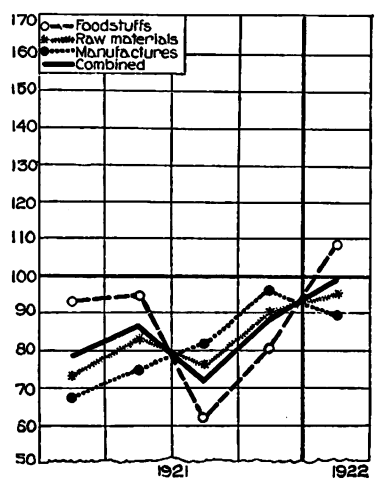
Our Foreign Trade Situation

"THE European industrial situation is by far the most outstanding single factor in our foreign trade," according to Dr. Julius Klein, director of the Bureau of Foreign and Domestic Commerce. Speaking before the First National Convention of American Importers and Exporters, New York, he declared that "it is by all odds the most conspicuous beacon on our commercial horizon by which our overseas efforts are to be guided. On the one hand, it shows the way to those markets across the Atlantic which buy every year nearly 60% of all our exports. On the other, it indicates the possible menace of European competition with American goods in other markets such as the Far East and Latin America. The Continent as a whole," said Doctor Klein, "and especially the United Kingdom, which is by far our best customer, is getting back to normal production of foodstuffs and, unless a new drought or crop failure occurs this season, will import reduced quantities of edible necessities. Although some populations, notably those of the Eastern and Central countries, are economically exhausted along many lines, many new operations are going on for the improvement of their productive capacity. The German Government, for example, is spending large sums on the improvement of the permanent equipment of the German railway system, the French and Italian Governments are carrying out large schemes for the utilization of water power, and several canal and other important public projects are under way.

"The various European countries are gradually returning to a saner political outlook and to a more complete recognition of their own economic situation. France is gradually realizing that its budget must be balanced out of current revenues, and that it cannot rely on German reparations. Italy has been able to effect cuts in government expenditures and is weathering the crisis caused by the Ansaldo and Banca di Sconto troubles. Germany is coming to the end of its artificial boom, and since German competition, maintained by depreciating currency, has been unfavorably affecting trade all over Europe, Germany's effort to balance its budget, under allied pressure, will have a widespread favorable effect."



Index of Volume of Exports.



Index of Volume of Imports.

(1920 Quarterly Average = 100).—*Harvard Economic Service.*

Demand for U. S. Products Increasing

THE tendency toward a gradual increase and broadening in the foreign demand for American products has continued during May. Automobile exports have been increasing rapidly, and it is reported that manufacturers of several of the less expensive but well-known makes have received orders which are beyond their capacity to fill. England, at present, is the most active market, and other countries of Europe and South America are buying more generally than a few months ago. Copper has also continued to sell actively abroad, the Orient, Germany, and France being the chief purchasers. April cotton exports were 598,000 bales, an increase of 137,000 bales, compared with the March total, and the largest total since December.

Export Advertising Records

ACCORDING to James S. Martin, speaking before the Foreign Trade Convention in Philadelphia, a system of home-office record-keeping is essential for the advertising exporter. The most important of these are (1) A card index of branch office and dealer imprints. It is best to obtain these imprints directly from the field, and to keep them listed in two forms: (a) a complete form which will include all the sub-offices and selling agents under the main branch or dealer, this imprint to be used whenever space permits; and (b) a brief two- or three-line imprint for use on posters, calendars, and other items in which the imprint is subordinate and a small space is appropriated for that use. (2) A card index of branch offices and dealers with a complete running record of all advertising material and special allowances sent or granted to them, together with the date of order, quantity, method of shipment. (3) A card index of all current items of advertising material. (4) A card index of shipments, which should consist of two files: (a) cards showing advertising shipments on order, and (b) the same cards removed to the second file when the goods have been forwarded. (5) A card file of dealers' percentage allowances for advertising. (6) A file of imprinted samples. Each catalog, folder or other item which is especially imprinted for a dealer should, whenever possible, be recorded by a sample in this file. (7) A file of clipped advertisements from all the foreign territories to which you export goods. This file has been found extremely valuable if it is properly used as an exchange.

AUTOMOTIVE

Automobile Export Prospects Excellent

A GENERAL survey of the foreign markets indicates that American automotive products are competing successfully with those of other nations. The favorable factors for the American exporter, says *Automotive Industries,* are the quality of the products themselves and their low price while the unfavorable factors are the rate of exchange with the various countries, and the high tariffs. However, foreign demand has increased to such an extent that it not only compares favorably with the better situation prevailing in the domestic markets, but reflects the improvement in business conditions throughout many parts of the world.

It is probable that the 1922 shipments of automobiles and of tires and accessories will exceed those reached in 1919 and that the year's trade will be the second largest in the history of the industry. This prediction seems warranted by the business already done, particularly in passenger cars, tires and equipment, and it is believed that later months of the year will not see any slackening of foreign demand.

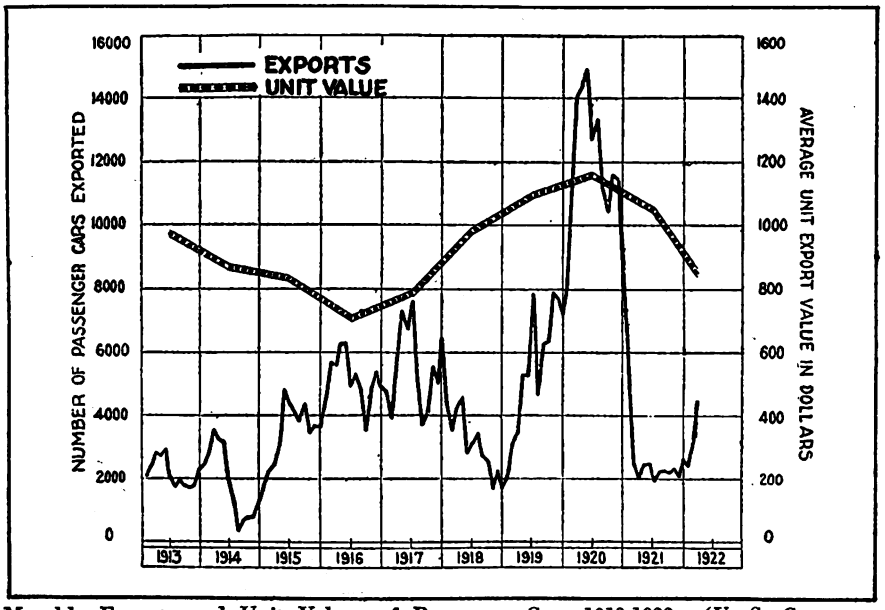
An evidence of the progress made by the United States in foreign markets is indicated by the following figures recently published by the New Zealand Motor Trade Association:

Origin of Imports	1919	1920	1921
Cars	Per cent	Per cent	Per cent
Canada	54	44	32
United States	44	46	42
Great Britain	2	10	20
Continent	..	..	6
Trucks and Lorries			
Canada	70	58	35
United States	27	26	30
Great Britain	3	16	29
Continent	..	..	6
Total values, incl'd'g chassis,	£1,125,088	£2,921,173	£1,210,762

Facts about the Chain Drive. Chief engineer of one of the largest chain manufacturing companies gives some simple but apparently little-understood facts about chains and their use. He gives the advantages of chains for final drive on motor trucks, and develops each of these. Then he goes into the care of chains, with reference to proper adjustment, lubrication, cleaning, enclosures, etc. Winds up with a list of possible chain troubles, due to bad design, bad workmanship, bad installation, wear, neglect or abuse. G. M. BARTLETT, *Commercial Car J.*, 4-15-22, 3100 w. MAH.

Motor Truck Indispensable to Lumber Industry. Experience of a number of widely differing concerns, with very divergent problems, located all over the known world, shows that in almost any lumber situation the truck is a necessity, as compared with horses or other means of transportation a great economy, and in the majority of cases an actual business getter. Experiences cited include getting out veneer logs in December in Wisconsin, hauling out huge timbers in a Southern camp where it acts as a locomotive working on wooden rails, hauling supplies to a Maine logging camp, getting in the firewood in the Far West, doing irrigation work on cut-over lands in the Central West, etc. *Motor Truck,* 3-22, 5100 w. MAH.

Laminated Automobile Suspension Springs. Author treats of their design and functioning, taking up in order such topics as vertical acceleration, nomenclature, determination of stress from strain in bending, weight and reliability, strength stiffness and resilience, etc. A. A. REMINGTON, *Automotive Industries,* 4-6-22, 6100 w. MAH.



Monthly Exports and Unit Values of Passenger Cars 1913-1922.—*(U. S. Commerce Reports.)*

Expediting Body Finish by Drying Equipment. Recent years have focused the car manufacturer's attention on the body, and they are now trying to make them as cheaply as possible, without reducing the quality. This has brought forth a demand for quicker painting and finishing methods, with the result that several lines of rapid drying equipment have been developed to speed up the drying of painted and varnished surfaces. So far has this gone, in fact, that one well-known light car is painted every 59 seconds, that being the time it takes a body to pass through the long drying oven, after it has been sprayed with paint or enamel. This article describes ovens used at Franklin and Chalmers plants, and presents a layout of a progressive system for rapid finishing. Also a schedule of operations for low- and medium-priced cars, and one for very high-grade work, using the drying equipment. J. E. SCHIPPER, *Automotive Industries,* 3-30-12, 3000 w. MAH.

S. A. E.'s Recent Standardization Work. Describes in detail recent parts, units or dimensions standardized by the Society of Automotive Engineers, or worked upon by its various standardization committees. There have been changes in the ball-bearing standards recently, new recommendations have been made on passenger car bumpers, new iron and steel specifications, leaf spring stock, rolling tolerances for concave spring steel, etc. *Automotive Industries,* 4-6-22, 2950 w. MAH.

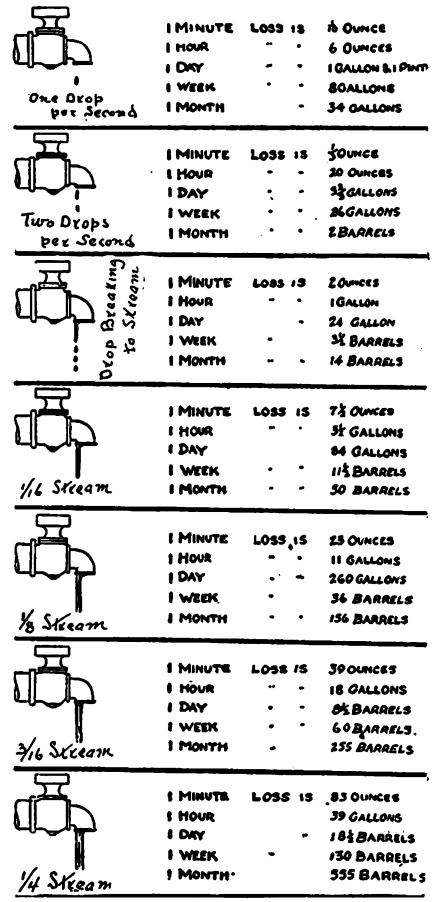
Significance of Rear Wheel Dynamometer Tests to the Engineer. A description of the car-testing apparatus installed at the Sheffield Scientific School at Yale, and the methods followed in its use. Significance of the data now being obtained to engineers generally, study of test results, rolling friction, wind resistance and tractive effort, efficiency of power transmission, fuel economy at various loads, etc. HERBERT CHASE, *Automotive Industries,* 4-20-22, 7500 w. MAH.

New Type of Compensating Differential. The differential used in all motor cars and trucks to give a different travel to each rear wheel when turning corners and in other situations, does not act correctly, since it differentiates for resistance, when it should differentiate for distance. That is why the average car becomes useless when one wheel is driven over glassy ice or is bogged down in deep mud or in similar situations. Many new forms have been designed with the idea of overcoming the drawbacks of the present form. The one which this article describes, the Krohn, utilizes the effects produced by fluid friction, and gives the greatest differential action at the lowest speeds, which is a very desirable point. The resistance increases as the speed increases. The essential parts of the device are double eccentric rollers, journalled in central driving plates fastened, respectively, to the two axle shafts. The driving plates also constitute an external and internal gear, respectively, which mesh with mating gears attached to the two axles. The driving plate external-internal gear unit can swing around the axis of the double eccentric when actuated to do so by the gears on the axle drive sections. When motion in the differential is induced as in turning corners, the internal gear on one axle and the external gear on the other turn in opposite directions. The compensating action consists of a swinging, gyratory motion around the centers of the supporting eccentric rollers. This motion causes them to rotate on their axes at a much greater rate than the shaft gears, the ratio in the Ford replacement unit being 12 to 1. The article describes the device more fully, and gives sectional drawings and photographs which help to make the action more clear. *Automotive Industries,* 4-20-22, 950 w. MAH.

Heavy Truck Weights Observed on Massachusetts Roads. Massachusetts and Connecticut have made very thorough investigations into the kind and character of the road traffic within their borders, preparatory to determining the proper kind of road to build to withstand it. This article describes some of the results obtained by the Massachusetts officials. Except for a short stretch of road between Westfield and Springfield used by crushed stone trucks from a very busy quarry, the greatest intensity of traffic was found on the Boston-Lynn traffic road, Boston-Lynn turnpike, Boston - Providence road, Boston - Woburn, Cambridge - Watertown, and Springfield-Holyoke roads, all of which showed 30 tons per hour. Other interesting facts are presented, also some salient facts in the State regulations which give road inspectors power to reduce, rearrange or otherwise change truck loads. *Engineering News-Record,* 4-20-22, 1250 w. MAH.

Improved Method for Designing Aircraft Parts. Because of the extreme irregularity of airplane ribs, struts and other parts, the determination of the neutral axis, radius of gyration and moment of inertia is difficult, laborious and time-consuming. Yet because of the importance of these quantities, they must be determined with considerable accuracy. The authors have worked out practical method of doing this; that is, working out the neutral axis, radius of gyration, and moment of inertia graphically. It is simple, quick, and is claimed to be very useful. It requires no other tools than the usual draftsman has, and a planimeter for measuring the area. Roy G. Miller and F. E. Seiler, Jr., *Aviation,* 3-27-22, 1600 w. MAH.

Drops May Be Small, but Waste Is Big.



The Chart Above Shows the Amount of Oil Lost, Due to Small Leaks.—*(Canadian Ford Owner.)*

Commercial Aviation Developments in Europe. After general introduction citing advances in commercial flying in Europe since the armistice, and some of the notable work in this country, author tabulates present status in various countries. He starts with France, and this is concluded, although the article is not. The tabulated figures accompanying the text give all the general available data on the subject, such as number of routes, number of 'planes flown, number of pilots, miles flown, horsepower of flying units, etc. W. Knight, *Aerial Age Weekly,* 3-20-22, 5700 w. MAH.

Reducing Road Wear through Tires. After going over the general transportation situation, this author, engineer for one of the largest tire concerns, points out the tremendous importance of tires, and the consequent advisability of conserving them. Then he proceeds to point out a number of ways in which this can be done. He favors the use of giant pneumatics under certain conditions, and the use of four rear wheels to make this feasible under very heavy loads. E. W. Templin, *Power Wagon,* 5-22, 3200 w. MAH.

Scheduling Work in the Repair Shop. Too much car and truck repair work is handled hit or miss, with consequent high costs, and dissatisfaction all around. This article points out that such work can be analyzed and scheduled so as to pass through the well-equipped shop just as quickly and economically as production wrk does through the small jobbing shop. He suggests advance estimates on all jobs, no matter how small; foreman planning work ahead for men and machines, and the use of a schedule board for showing present and planned work for each man and machine, at a glance. Not too technical, no suggestion of time studies or other involved and expensive methods, just a simple plea for common sense in a rather difficult business. J. H. Radebaugh, *Commercial Car J.,* 4-15-22, 3200 w. MAH.

High Cost of Service. Selling trucks will ultimately settle down to a question of service, and this author points out that fact, following it up with a description of a number of truck service stations. These might be classed as good, bad and intermediate, so that they represent all of the present phases of this situation. Reasons are given for present high costs, and concrete examples are presented to show how these may be reduced. Proper equipment is outlined for various sized service stations, and proper methods of using it. Of interest to the truck manufacturer, truck dealer, service station manager or owner, and to a certain extent, to truck owners. C. P. Shattuck, *Commercial Car J.,* 4-15-22, 2,900 w. MAH.

Wright Six-Cylinder Airship Engine. Technical description of this new design which has a 7-in. bore and an 8-in. stroke, developing 400 h.p. at 1400 r.p.m. and weighing but 3.3. lbs. per h.p. It is an entirely new design and is quite different from the Hispano previously built by the Wright Company. Said to have been designed for 100 hrs. continuous running at full throttle, which calls for very rugged construction, and accounts for the weight of the engine. *Aviation,* 5-1-22, 1000 w. MAH.

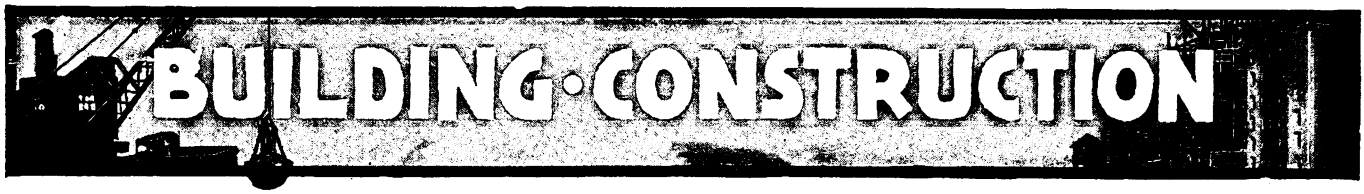
Stockkeeping System to Aid Efficient Service. The cry of today from car and truck owners is service, many putting service of the highest efficiency above the actual design and construction of the car and truck. The author describes the very thorough system devised for and used in the seven branches of the Packard Motor Car Co. of New York, and by its twenty-nine dealers. Forms are shown and their use described. Phillip H. Smith, *Automotive Industries,* 4-6-22, 3600 w. MAH.

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Lower Freight Rates Mean Lower Prices

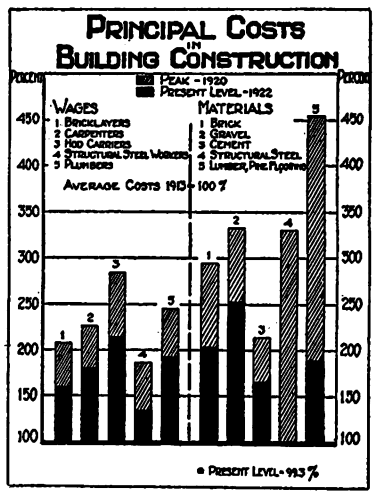
IT is believed that the present freight-rate decision will give an added impetus to the building boom that is now under way. Lowering of the rates is expected to have a favorable effect upon material prices, which have been mounting skyward for the last few months. While the price of lumber is going up at the mills, the saving in freight may offset the increase in price. The cost of sand and gravel, in which transportation charges play such a large part, is also expected to be lowered. And on some materials where the price is largely determined by production costs, the price will be decreased if the production cost depends upon the transportation of raw materials. Portland cement, which belongs to this class, has increased in price because of the excessive rates on the materials from which it is manufactured.

The American Contractor points out that the stabilization of material prices is essential to the continued prosperity of the construction industry, for while *necessary* building is not likely to be halted by high prices, speculative building is almost certain to be retarded while prices of materials are on the upgrade.

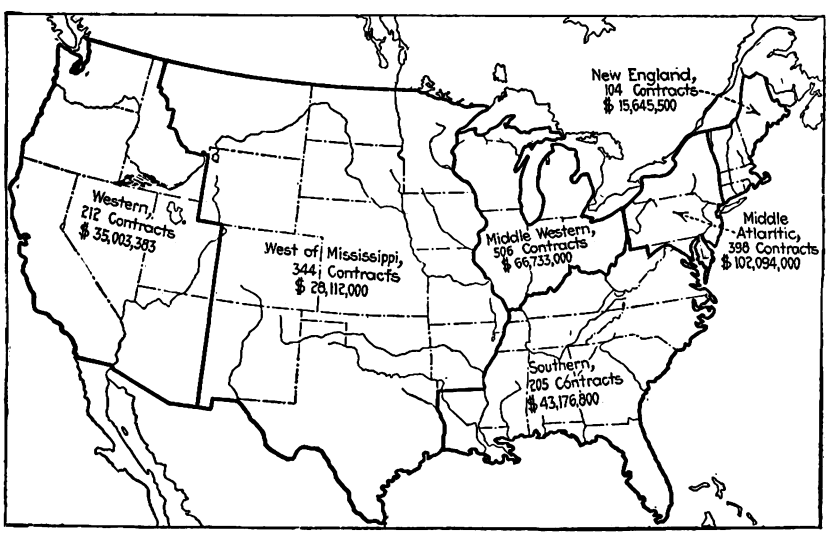
Design of Safe Construction—Reinforced Pressure Tank. Reinforced concrete used to an increasing extent in construction of tanks and reservoirs. In most of designs all tensile stresses are resisted by reinforcing steel, while concrete serves to hold steel in place and provides impervious walls for the reservoir. Stress of 10,000 lbs. per sq. in. necessary to secure water tightness. Hoop tension of side walls, soil pressure and air pressure important considerations. Tank must have tight upper base firmly fixed to walls. Flat, circular slab best for purpose; should be fastened to walls by means of vertical reinforcement. J. F. MANGOLD, *American Builder,* 5-22, 2500 w. HHH.

Nebraska State Capitol. Article describing some details of planning and ornamentation of building. It is 437 ft. square, two stories high with interior court. In center of court is cross-shaped executive building with tower 80 ft. square and 400 ft. high. BERTRAM G. GOODHUE, *American Architect,* 5-10-22, 4000 w. EMcC.

How to Build for Steel Sash. Standardization of sizes of steel sash by various manufacturers so that any standard construction method can be applied interchangeably to different makes has increased use of steel sash on small construction jobs. For factories, school buildings, public buildings, etc., standard steel sash is mainly pivot type. As a rule, this type of sash does not call for separate steel framework, but is set directly into walls, reducing cost of construction, but emphasizing necessity of constructing walls properly to receive sash. *American Builder,* 5-22, 2000 w HHH.



(Architectural Forum)



Distribution of Important Construction Contracts for the First Quarter of 1922; Based on Figures of F. W. Dodge & Co.—*(Engineering News-Record.)*

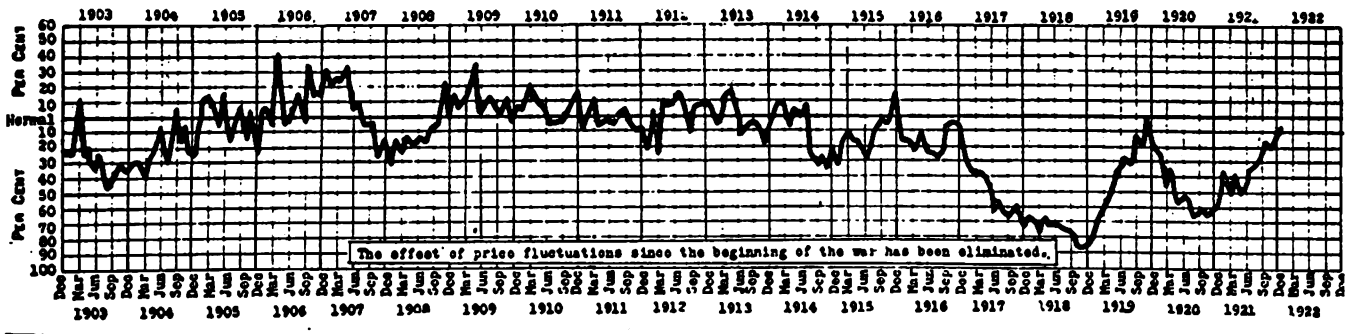
How to Kill "White Ants." In order to prevent white ants from damaging buildings, foundations should be entirely of stone, brick or concrete, including pillars in basement or cellar. Walls, partitions and flooring on ground floor, basement or cellar should also be of concrete. Wooden flooring can be laid over this concrete floor if more desirable. Air space should be left between concrete floor and wooden floor laid over it. Concrete floors should be laid on gravel base, which will prevent dampness and cracking. Points of juncture between concrete walls and flooring should be filled in by rounding off concrete at these places, since cracks often occur where wall and floor join at right angles. Where stone or concrete foundations are impracticable, timber impregnated with coal-tar creosote should be used. *Retail Lumberman,* 5-22-22, 1500 w. HHH.

Stanford Stadium Built of Timber on Earth Fill. Athletic stadium recently completed for Leland Stanford, Jr., University, embodies unusual design and construction features. Outstanding features are: (1) use of timber in seating structure instead of concrete, (2) placing of embankment by scrapers to form support for seat structure, (3) speed with which built, (4) skill and efficiency in prosecution of work. Article covers: general description, embankment, grading methods, soil investigation, timber structure, framing seating structure, horticultural features, drainage, cost. E. E. CARPENTER, *Eng. News-Record,* 5-4-22, 2000 w. CS.

Use of Explosives in Road Building. Very comprehensive article covering various explosives and proper use. Covers: blasting stumps, removing trees, blasting boulders, post holes, earth and rock excavation, rock cuts, ledges, etc. *Highway Engineer and Contractor,* 5-22, 4000 w. CS.

Standardizing Sand, Gravel, Crushed Stone and Slate. Gives brief outline of what has been done to standardize these products. *Amer. Contractor,* 4-29-22, 500 w. CS.

Bates Experimental Road Undergoing Tests. Gives methods of tests and results so far attained. *Highway Engineer and Contractor,* 5-22, 2500 w. CS.



Record of New Building Permits in 19 Cities, Excluding New York, Over 20 Years, Showing Value of Permits Compared with Estimated Normal.—*(Architectural Forum.)*

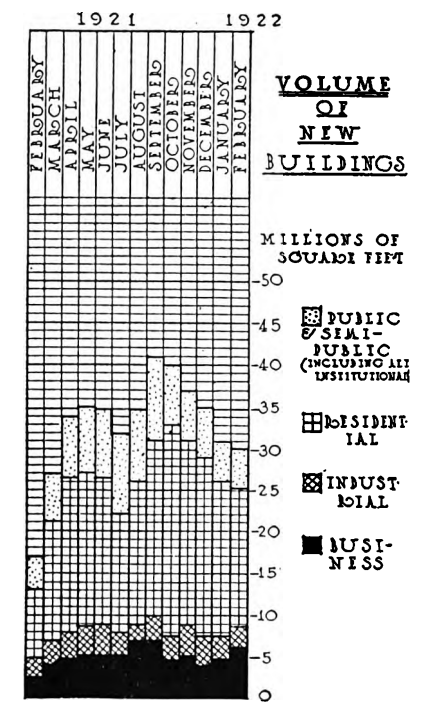
Architect's Agreements with Owner. Misunderstandings which threaten to develop into legal proceedings often result of failure to establish proper agreements covering such specific questions as following: (1) In case architect is retained to design building on which owner has already given specific cost limitation, what is legal position of architect if it is found that cost runs considerably over figure when bids are taken? (2) How much of fee can architect collect in case building project is abandoned? (3) What is architect's position in matter of collecting fees if construction is unreasonably delayed? (4) What is architect's position when building project is transferred from promoter to another owner? Discussion of fees and methods of payment may be approached from viewpoint of mutual protection, so that no owner will hesitate to enter into proposed agreements. Three methods of meeting situation include (1) Determining amount and time of payment by verbal agreement with owner. (2) Establishing contractual relationship in letter form. (3) By use of properly executed contract between architect and owner. C. STANLEY TAYLOR, *Architectural Forum,* 5-22, 4000 w. HHH.

Study of Construction in Architectural Education. Theory of construction valuable to student in designing structural work of ordinary buildings, in consulting with engineers, in supervising construction and in giving him qualitative sense of construction. Teaching of design and drawing develops only one side of student's nature; study of building construction demands continual use of imagination in visualizing problem and continual use of judgment in evaluating elements which affect it. By working out structure of problem in design, student gains not only ability to design a beam, but sense of real forms with which he is dealing. CHARLES W. KILLAM, *Architectural Forum,* 5-22 1500 w. HHH.

Elevator Installation. In laying out elevator installation, one of first things to be determined is speed and load. Under generally accepted regulations passenger cars are figured at rate of 75 lbs. live load per sq. ft., while cars to carry freight are figured at capacity determined by purposes for which they are to be used. Speed of car determines size of machine; when arranging for overhead work this must be taken into consideration. Elevator contractor should be furnished special ¾-inch scale sketches showing general conditions existing around elevator shafts. From these sketches, drawings showing general arrangement of elevator installation can be made by contractor, which should be approved by architect. Pit in connection with shaft is of prime consideration. In majority of cases, with exception of traction drive elevators, depth of pit of at least 3 ft. 6 ins. from lowest stop to bottom of pit should be allowed. Waterproofing of pits and machine rooms where they are built in connection with pits, necessary. HERBERT M. GARRIOTT, *Architectural Forum,* 5-22, 2700 w. HHH.

Structural Design Problems. Editorial on subjects of restraint, continuity and unbalanced moments in designing beams, girders and slabs. Treats subject completely and in simple language without mathematics. Presents practical, graphical method and discusses a problem which was solved by its use, where the neglect to consider continuity had been costly for a school board. *American Architect,* 5-10-22, 3000 w. EMcC.

Country House in the Italian Manner. Description of house along Italian villa lines, but adapted to American environment. MATLACK PRICE, *Architectural Record,* 5-22, 1500 w. CS.



(Architectural Forum)

Small House Service Is Growing. Gives plan of American Institute of Architects to assist small house builder, through their Small House Service Bureau. Plans on file of two to six-room dwellings, with complete details, including quantity survey. Local and district agencies being established throughout country. Plans purchased from architects at regular prices, and retailed at small cost to home builder. Purchaser entitled to question service. EDWIN H. BROWN, Construction Economics Edition, *Amer. Contractor,* 4-29-22, 3500 w. CS.

Building Material and Construction Costs. Part X. Covers roofing material, with costs and other data—tin, galvanized, copper, zinc, formed rolls. THEODORE F. LAIST, Construction Economics Edition, *Amer. Contractor,* 5-6-22, 2500 w. CS.

Building 10 Million Gallon, Reinforced Concrete Reservoir. Covers: design, construction, equipment, labor, costs. Description of Indianapolis Water Co. reservoir. WILLIAM CURTIS MABEE, *Municipal & County Eng.,* 4-22, 3500 w. CS.

Recent Park Planning in German Cities. War put stop to development, but now being undertaken. Discussion of plans of various cities with diagrams. HUGO KOCH, *Architectural Record,.* 5-22, 1500 w. CS.

Tendencies in Apartment House Design. Part XI. Covers relation of floor area to ground area and rental values. Illustrated with diagrams. FRANK CHOUTEAU BROWN, *Architectural Record,* 5-22, 6000 w. CS.

Architectural Polychromy. Part V. Covers color treatment of capitol, cornice and other details. Well illustrated. LEON V. SOLON, *Architectural Record,* 5-22, 2500 w. CS.

Effect of Construction on Heat Losses from Buildings—Part II. Covers sashing and glazing and weather strips. S. HOMER WOODBRIDGE, *Heating & Ventilating Mag.,* 5-22, 2000 w. CS.

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Europe Still Needs Our Wheat

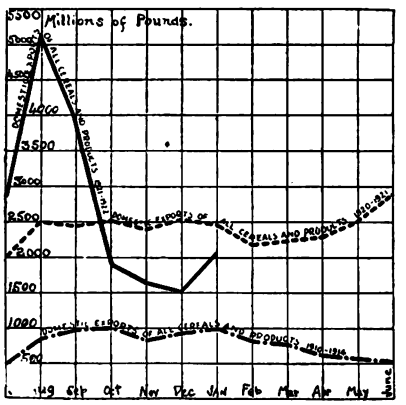
ACCORDING to *Dixie Miller*, it will be necessary for this country to produce 800,000,000 bus. of wheat as a minimum in order to meet world requirements. While the visible supply in the United States remains large, it is pointed out that farmers are liquidating, farm reserves are not large and we have already exported more wheat than our theoretical surplus. Although Argentina and Australia have made heavy shipments for several weeks, and have considerable yet to ship, the wheat afloat only equals four or five weeks' supply.

Europe is still under the necessity of buying large quantities of foodstuffs before the new harvest is available and the world carryover at the end of the crop year on July 31 will surely be small. To meet European demands it will be necessary to produce 600,000,000 bus. of winter wheat and a minimum of 200,000,000 of spring wheat.

While at present predictions in regard to the winter crop are premature, the winter kill appears to be no more than usual, while eastern Kansas and the States east of the Mississippi are reported to be showing up well. The danger spots are said to be western Kansas, Oklahoma and the Texas Panhandle. Up to the first week in March drought had prevailed since last autumn, when the wheat was seeded in dry soil, and although, with ideal weather conditions, a considerable crop might be harvested, the probabilities are against it.

American Flour in Levant. Two difficulties confronting importer of flour into Greece: unfavorable situation of Greek exchange; difficulty of buying remittances to pay for imported goods. In introducing flour in this market much depends on ease with which brand may be popularized. Many buyers and consumers do not understand English wording, so brand must be recognized by some feature of design. Constantinople not likely to offer permanent market for American and Canadian flour, but at present time from 10,000 to 12,000 tons each month are imported into city and probabilities are that requirements for next three or four years will be large. C. F. G. RAIKES, *Northwestern Miller*, 5-10-22, 4000 w. HHH.

Power and Lighting Economies in Bake Shop. Carelessness in handling machinery or in maintaining it in proper working condition are two greatest causes of excessive power demands. Improper arrangement of lights, unnecessary use of lights, or dark, heavy painted interiors increase cost of lighting service. Installation and arrangement of equipment have permanent effect upon consumption of power, hence care should be taken in laying out plant to avoid unnecessary complication in transmission system. Machine friction or resistance big factor in power consumption. Machinery should be properly lubricated and shafting and machinery should be in perfect alignment. In every belt-driven installation, great amount of power is lost by belt slipping, this loss varying from 2% to 20%. To be efficient, belts should be kept tight enough to prevent more than 2% of slippage. When machine is driven by individual motor, care should be taken to see that driving motor gear is running in proper mesh with driven gear, or that chain belt is running true and with proper degree of tension. Electric motors must be kept clean and well oiled. *National Baker*, 5-22, 1800 w. HHH.



(From U. S. Commerce Reports)

Domestic Exports of All Cereals and Products.

Underbolting. Wide divergence of opinion upon amount of bolting surface required for removing flour made by rolls. Since wheats milled are of varying degrees of hardness, bolting surface required on any mill will vary according to hardness of mill blend. Much harm may result to stocks of mill by causing product of rolls to pass over more sifting surface than necessary. Particularly true of heavy material sifted on wire, such as scalps of breaks. Greatest danger is carrying flour with middlings to next roll. Fine, bluish white product of reduction inferior in every way to material that has been reduced only just enough to allow its passage through meshes of proper flour-cloth. Although flour may appear more specky it will carry lower percentage of ash and higher percentage of gluten. Miller who must depend wholly upon ability to judge flour by appearance often misled by superior dress and apparent whiteness of product of underbolting. Usually requires physical and chemical analyses, and baking to ascertain why a flour fails to produce satisfactory results. E. S. MILLER, *Dixie Miller*, 5-22, 1200 w. HHH.

Quality Bread. High standard quality loaf should not be too sweet, of fair expansion, good interior development, creamy white in color, have appetite appealing flavor, be well baked, and devoid of sogginess. Prolonged fermentation certain to result in excessive invisible loss for both sponge and straight dough. Correct fermentation means making dough with proper hydration, and at minimum point of viscosity, carried on at low temperature so as to obtain maximum baking value from all material used. J. E. WILLFAHRT, *National Baker*, 3000 w. HHH.

Static Electricity in Flour Mill. Dust fires often caused by presence of static electricity. Fires and explosions often started from such slight causes as exciting of static sparks when pouring gasoline from one vessel, not properly grounded, into another. Every exciting cause of electricity in flour mill should be well grounded, particularly all machines which have iron frames. Extreme caution necessary to avoid danger. *Dixie Miller*, 5-22, 1500 w. HHH.

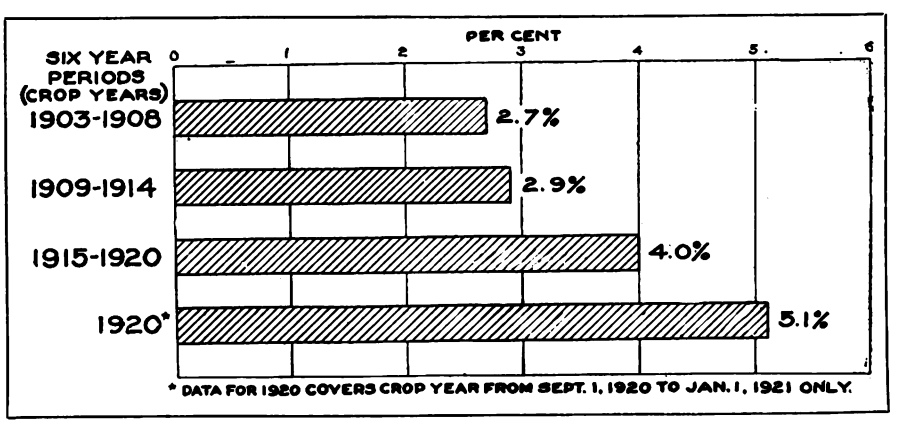


Chart Showing the Gradual Increase of Dockage Found in Spring Sown Wheat from 1903 to 1920.—*(Grain Dealers Journal.)*



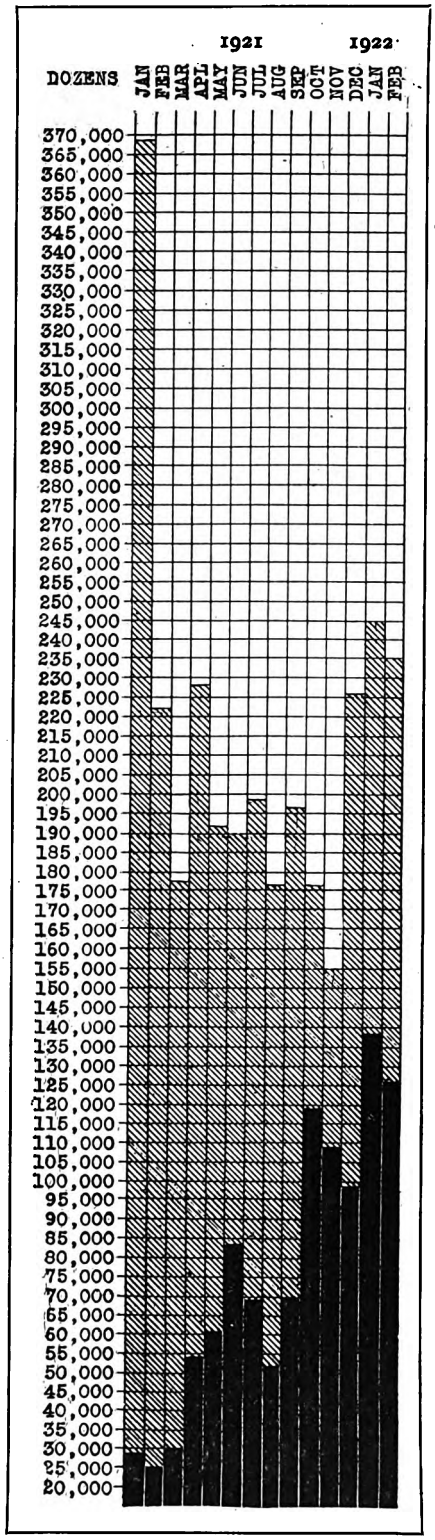
Men's Clothing Prices May Advance

AN advance in the price of men's clothing is predicted by the *Manufacturing Clothier* as a result of the impetus that has been given the industry by new styles both in cloth and in the cut of garments, the better outlook for business, and, lastly but most important, the tariff.

It is believed that the placing of a duty of 33c. a pound on raw wool by the Senate Finance Committee will tend to bring about a considerable price rise in the clothing industry. A duty on raw material, unlike a duty on the finished product, increases costs all along the processing line. Moreover, this duty will bring up the cost of domestic raw material to the cost of the imported material.

It is not probable, however, that the effect of the tariff will be reflected until the fall season is under way, since clothing manufacturers have covered their requirements for the opening of the season on cloth bought at the low levels made by the textile mills early in the year.

Since the textile industry in this country uses about 60% foreign wool and only 40% domestic wool, it is estimated by the *Manufacturing Clothier* that of the anticipated increase of $360,000,000 a year in the clothing bill of the nation, only about $45,000,000 will go to the American wool grower.



Imports and Exports of Cotton Hosiery from January 1, 1921, to March 1, 1922. Black Bars Represent Imports, Shaded Bars Represent Exports.—*(Underwear & Hosiery Review.)*

Pongee. Dry cleaning is not satisfactry with pongee. Hard brush injures fabric; best run in washer with good benzine soap; after drying wash with soap bark or tetropole solution, rinse with acetic acid. Use a sponge. In spotting learn cause of stains as often steaming will remove. Seldom necessary to bleach pongees, instead treatment with potash and sulphuruc acid. Best bleacher for delicate shades is hydrogen peroxide. Add little bluing if bleach is not sufficient. In dyeing, best results obtained by two baths; to bottom direct colors, to top with acid colors, with addition of formic acid. All dyeing with substantive colors can be topped with basic colors, but there is danger of cracking and unevenness. Pongees should not be sized, if finishing is done damp. JOSEPH LOEBL, *Textile Colorist,* 5-22, 800 w. MBB.

The Life Story of Flax. Flax is said to be known in stone age, from excavations of lake dwellings in Switzerland. Cultivated very early in Egypt, Mesopotamia, Persia. Used in England, 1532; in America, at Plymouth, Mass., 1639. Much waste in method of cultivation then; straw left from separation of seeds from stem always burned. MRS. CHETWOOD SMITH, *Fibre and Fabric,* 5-2-22, 600 w. MBB.

Scouring Rugs and Carpets. Method of recording order and of collection and delivery outlines. After dusting in wheel or by less vigorous ways in case of suspicious rugs, spots are removed and small repairs made. Scoured on table or floor with revolving brush working in soft soap of rather heavy consistency, then rinsed, scraped and dried. If tendency to change color is noted, weak acetic acid bath brings back color. Open-air drying most satisfactory. E. A. TABOR, *Cleaning and Dyeing World,* 5-22, 1000 w. CJW.

Nibs and Lousiness in Dyed Silks. Lousiness is caused by silks with low cohesion; affected by temperature of water, speed of reeling, cross or croisure made during spinning, cleanness of water and mineral salts in water. Nibs are only defect made by worms. Raw knots, corkscrews, large knots and loops are made during spinning. Diseases of silk worm do not seem to cause more nibs or splitting of fiber. Nibs are not made in dyeing operations but are developed by improper dyeing manipulations. Visibility of nibs is lessened when silk is dyed black and is greatest in yellow. L. C. LEWIS, *Am. Dyestuff Reporter,* 5-8-22, 500 w. CJW.

Developed Dyes in Hosiery Dyeing. Application; list of direct cotton colors that permit of diazotization and developing: list of developers and how to use them: list of shading dyes; and use for silk. J. F. SPRINGER, *Textile American,* 4-22, 6000 w. WRR.

Woolen Blanket Manufacture. Methods of making fancy blankets. White blankets with borders; traveling blankets; binding double fabrics; fringes add to appearance, Pullman blankets. *Textile World,* 4-8-22, 3000 w. WRR.

Tin Weighting in Silk. Description with charts of a practical analytical method for this determination. Ash determination; specific gravity; chemical stripping of weighing materials. A. A. COOK, *Textile World,* 4-15-22, 2500 w. To be continued. WRR.

Hat Talks. Third of a series, this instalment discussing price as a factor in sales. FRANK BEATTY, *American Hatter,* 4-22, 900 w. WRB.

Retail Direct Advertising. Persistence and continuity essential to success. Aim of direct advertising should be clear in mind of advertiser—whether it is to be for sales, inquiries, good-will, etc. Strength of appeal may depend upon copy, illustrations, type, unusual paper used for mailing or combination of one or more of these features. Securing a "live" list essential to success of direct-mail campaign. ROBERT E. RAMSAY, *National Retail Clothier,* 5-22, 2000 w. HHH.

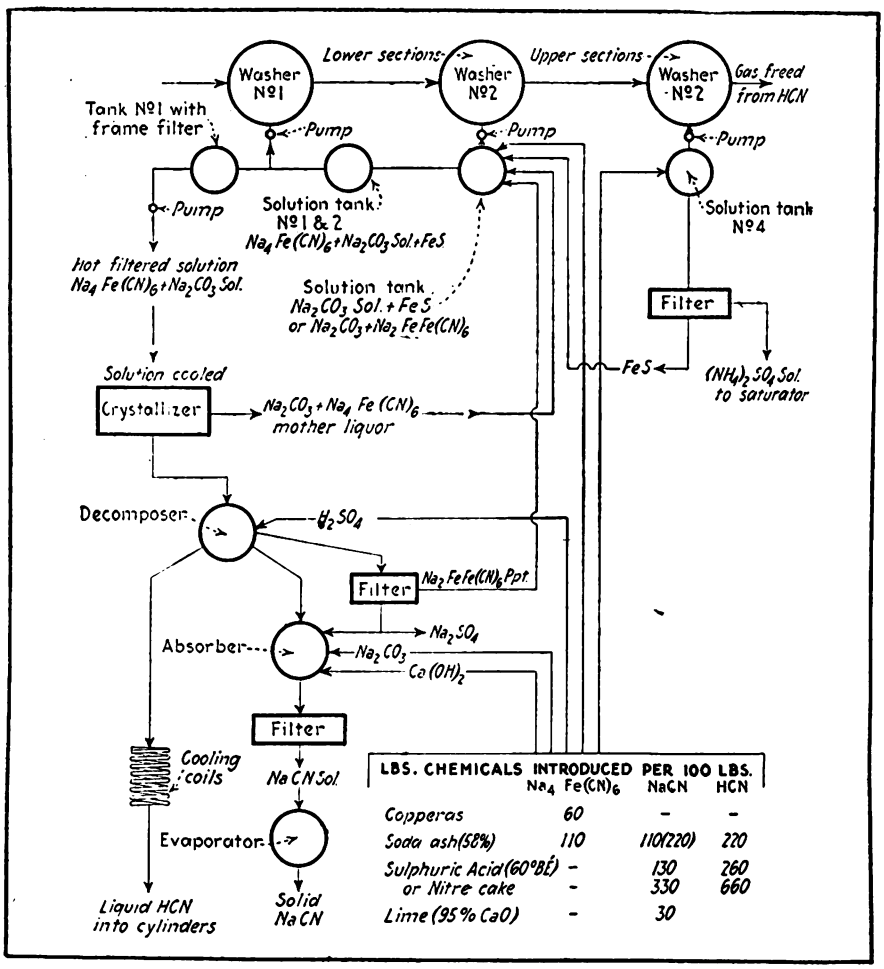


For and Against the Dye Embargo

ACCORDING to *The Annalist*, the most important facts in the controversy over the proposed selective embargo for the dye industry are: (1) The charges of monopoly and combinations against the American industry have died from failure of proof. (2) As there seems to be no objection to high tariff rates, the method of protection has narrowed down to a question of an embargo of high ad valorem and specific duties. The advocates of the selective embargo base their arguments on the following points: (1) Germany, having had a complete monopoly of the industry for 50 years until the beginning of the war, enjoys the advantages of (a) having experienced chemists, (b) low manufacturing costs, (c) the condition of foreign exchange, (d) the demand of the world market for her products; (2) There are more than 200 plants engaged in the manufacture of chemicals and dyestuffs in this country, each in competition with the other; (3) Official comparative prices show the ability of the German manufacturers to manipulate export prices in order to overcome high tariff rates; (4) the possibility of being again dependent on a foreign country for dyes, chemicals and pharmaceuticals.

The arguments of the importers and those consumers who have not objected to strong tariff protection, but have fought the selective embargo, may be summarized as follows: (1) It is asserted that the delays incident to determining whether or not a similar American product is suitable for certain purposes often causes consumers loss of business. (2) Manufacturers using dyes claim that if they are not permitted to obtain the German product for certain purposes they will be handicapped in their fight against foreign competition. (3) It is held that the dye and chemical section of the Bureau of Imports is incompetent to judge as to the relative merits of foreign and domestic colors. (4) With respect to pharmaceuticals, it is argued that physicians should be permitted to buy the product in which they have most confidence. (5) The claim is made that if American manufacturers would write off their losses, due to depreciation of value of their warehouse stocks, they would be able to meet foreign competition with the protection afforded by the tariff rates.

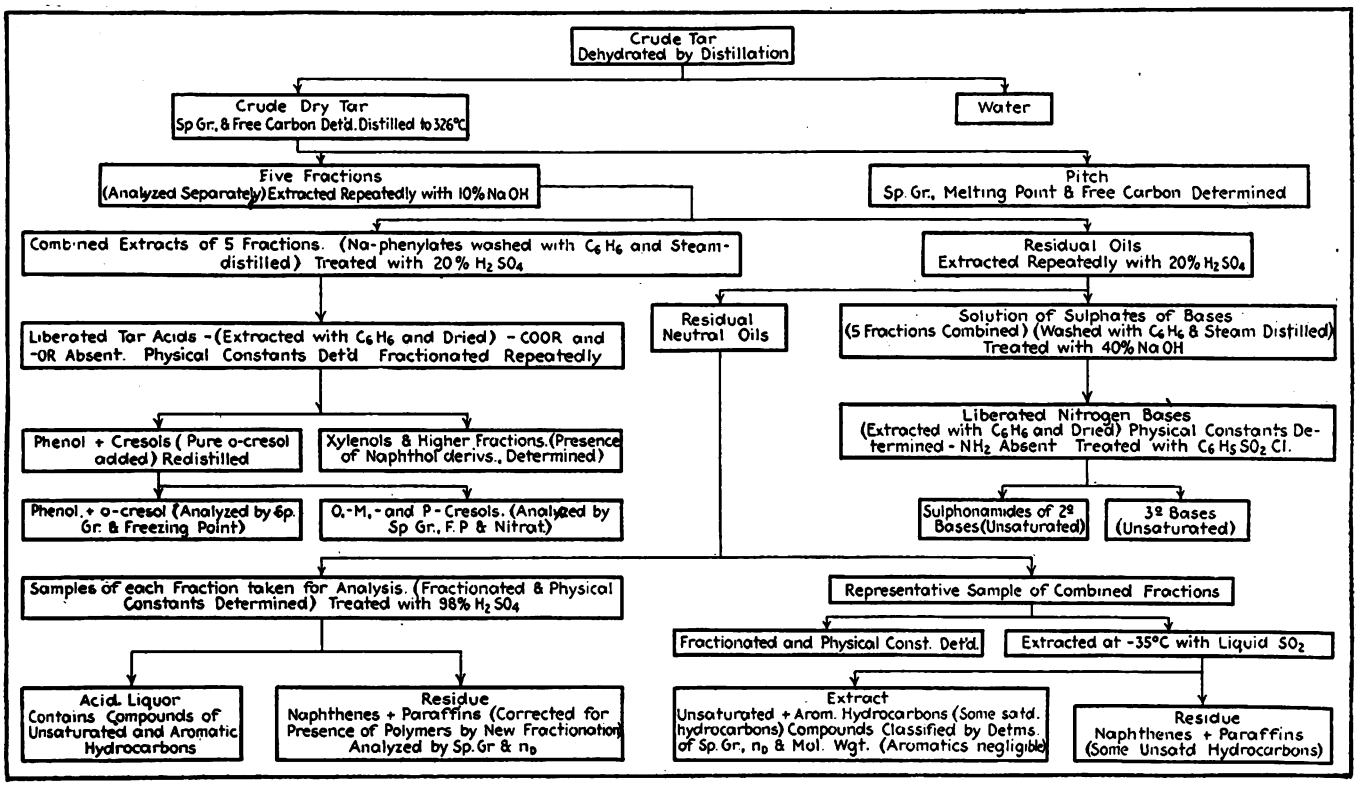
Cyanide from By-Product Coke Ovens. Cyanogen compounds available in American coke oven gas are adequate to supply our entire demands. Ordinary uses of cyanides are: extraction of gold and silver from ores, generation of HCN for fumigation of fruit trees, etc., case-hardening of steel, electroplating, and miscellaneous uses, such as synthesis of dyes. New process of recovery described (see flow-sheet) based on washing with strong solution of alkali in which is suspended an iron compound, capable of combining with HCN of gas, which is recovered as sodium ferrocyanide. The crystals are treated with sulfuric acid, liberating half the hydrocyanic acid. Estimated price of HCN is 9 to 13 cents per lb., as compared with 30-50 cents for synthetic product. E. V. Espenhahn, *Chem. Met. Eng.*, 5-17-22, 2000 w. CJW.



Flow Sheet of Process for the Direct Recovery of Cyanogen Products from Coke-Oven Gas.—See Digest, "Cyanide from By-Product Coke Ovens."

Alunite Deposits in the United States. This little-known but very valuable mineral is the basis of much of our potash, aluminum and sulphuric acid, also of alum, refractories, abrasives, and, to a smaller extent, of the sulphate chlorate formate acetate bromide and chlodire of aluminum. Perhaps the largest deposit is in the Tushar Mountains, Piute county, Utah, at an elevation of 10,000 ft. This was found while prospecting for gold, 12 years ago, and has been mined on a large and growing scale ever since. The article describes the mines, the camps where the men live, the difficulties of getting the machinery and equipment up there, the topography of the ground, methods of mining, hauling, milling and shipping the products, and other interesting details. Many figures are given on production, exports and imports of potash, aluminum and other salts, sulphuric acid supplies and prices, and much other correlated data. R. H. Tingley, *Rock Products*, 3-25-22, 6,400 w. MAH.

Bleaching Agents. Comparison of hypochlorous acid and chlorine as bleaching agents leave no doubt that, considered simply as bleaching agents, chlorine is more active than hypochlorous acid. Active bleaching properties generally attributed to hypochlorous acid are for most part imaginary and not characteristic of pure substance itself. R. L. Taylor, *Am. Dyestuff Reporter*. 5-8-22, 2000 w. CJW.



Scheme of Examination of a Low-Temperature Coal Tar. See Digest—"Low-Temperature Coal Tar."

Low-Temperature Coal Tar. Outline shown in cut. Tars produced by "Carbocoal" process, using Pa. bituminous coal known as "Pittsburgh Terminal." Yield, 225 lb. per ton or 11.3%. Composition of tar: phenols, 13.7%; bases, 0.624; alcohols, .0; hydrocarbons: paraffin, 1.6; naphthalene, 2.8; unsaturated. 13.4. Composition of phenol fraction shown in this table:

Composition of the Low-temperature Phenols
Percentages by Weight, Basis of

Component	Phenols	Distillate	Crude Tar
Phenol	4.2	1.9	0.6
Cresols *a*.....	33.4	15.2	4.9
Xylenol fraction ...	19.0	8.7	2.8
Higher homologs...	34.8	15.9	5.1
Pitch (acid resins)..	8.6	3.9	1.3
Totals 100.0		45.6	14.7

a Ratio: 27% ortho-, 19% meta- and 54% para-cresols.

(To be concluded.) J. J. MORGAN and R. P. SOULE, *Chem. Met. Eng.*, 5-17-22, 2750 w. CJW.

Acidity of Nickel Depositing Solutions. Measurements have been made of hydrogen ion concentration of nickel-plating solutions. Cathode efficiency is increased either by raising current density of hydrogen ion concentration (pH) or both Near pH 6, or above, current density has little effect upon current efficiency. In operating bath at comparatively low pH (high velocity), raising current density will help to compensate for loss in current efficiency. If operating at low current density, solutions of high pH must be employed to secure high efficiency. Below pH 3 and up to 5, gas pits and streaks, which are usually attributed to hydrogen evolution, are very pronounced. Cracking and peeling of deposits are generally encountered in this range. Between pH 4 and 5.5, gas pits and streaks may appear, but are not likely to be pronounced, and cracking or curling is less common. Between pH 5.5 and 6.5 gas pits and streaks are only rarely encountered. Above pH 6.3, blistering, cracking or curling are again likely to occur, also "burning" of deposit near sharp edges. Significant that commercial baths have fairly constant pH of 5.7. M. R. THOMPSON, *Trans. Am. Electrochem. Soc.*, 1922, 25 pp. CJW.

Pharmaceutical Junk. Much old stock in drugstores, worthless therapeutically, or at least sub-standard, which it is contended has material recovery value. Because of comparative ignorance regarding composition of most pharmaceuticals it would be taking undue chances to mix old material with new. Recovery value limited to alcohol, if content is above 10%, possibly oils, which may be sold for soap stock or leather tanning, and a few costly and simple substances like quinine, morphine, codeine and similar products. Expense of recovery important item. J. M. FRANCIS, *Bull. of Pharmacy*, 5-22, 1200 w. CJW.

Explosive Plant. Description of Northern Explosives, Ltd., at Dragon, Que., which has capacity of 5,000,000 lbs. of commercial explosives per year. Consists of nitrator, expense magazine, wet gun cotton store, and 3 complete powder lines at right angles to other units. All machinery specially built. Buildings of wood, with wooden floors covered with rubberoid up to about 18 in. inside walls, roof of wood with metal shingles. Wooden rails by each building, doors open outward, no steel locks, catches, etc., all corners rounded. Nitrator of Hough type, taking charge of 1500 lbs. glycerine and 9000 to 10,000 lbs. mixed acids. Denitration unit is included in "Red Area." General description of acid plants. *Canadian Mining Jour.*, 4-28-22, 2000 w. CJW.

Wool Scouring Wastes. Concentrated wool scouring wastes liquor so far made contain 42% moisture, 14% potassium oxide, 1.25% nitrogen and 14% grease. Fertilizer material made from this and another waste material on factory scale contains 6.5% water soluble potassium oxide, 6.1% total nitrogen, 3.4% water soluble nitrogen, 1.9% alkaline permanganate and 1% neutral permanganate in soluble nitrogen and 6.8% grease. This material is in excellent mechanical condition, may be easily handled in fertilizer mixing and grinding machinery and in addition is good dryer, with dark color and fine strong odor. F. P. VEITCH, *J. Ind. Eng. Chem.*, 5-22, 1000 w. CJW.

Wool Fast-Color Dyeing. Suggests value of vat colors; means great advancement to wool-fast-dyeing industry. *Textile Colorist*, 4-22, 1200 w. WRR.

Hard Water in Bleaching. Cause of hard water and two methods of water softening. WILLIAM B. NANSON, *Textile American*, 4-22, 1200 w. WRR.

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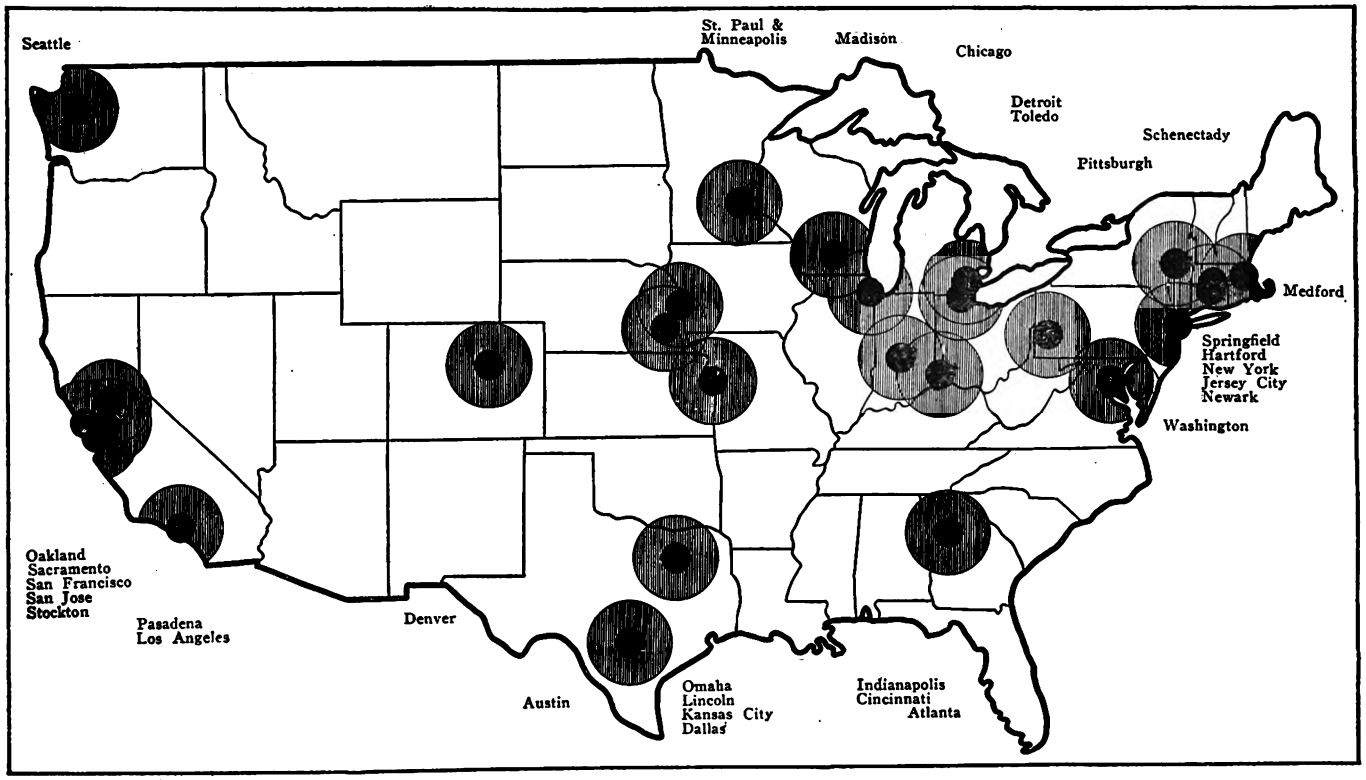
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ELECTRICITY

Principal Radio Broadcasting Stations in the United States

THE black circles below represent a 30-mile radius from broadcasting stations, and the shaded areas show the 100-mile range. This gives a general idea of the localities in which the greatest sales of short-range radio receiving apparatus can be made. Vacuum tube sets, with various amplification equipment, can catch broadcast from stations 1000 or more miles away. This chart presented by courtesy of the *A. B. P. News*, published by the Associated Business Papers, Inc.



A List of Stations Sending Messages with Call Letters, Wave Length, Name of Controlling Company and Range.

Anacostia, D. C., NOF, 350 meters.
Atlanta, Ga., 4CD, Carter Electric Company.
Austin, Tex., 5ZU, 360 meters, Southern Radio Co., 200-500 miles.
Chicago, Ill., KYW, 360 meters, Westinghouse Co., 2,000 miles.
Cincinnati, Ohio, WMH, 360 and 485 meters, Precision Equipment Co., 1,000 miles.
Cleveland, Ohio, WHK, 360 meters, W. R. Cox, 300 miles.
Columbus, Ohio, 8YO, 275 meters, State University, 700 miles.
Dallas, Tex., WRR, 450 meters, Police Department, 1,500 miles.
Davenport, Iowa, WOC, 360 meters, Davenport School of Chiropractic, 600 miles.
Denver, 9ZAF, 360 meters, Reynolds Radio Co., 1,500 miles.
Denver, DD5, 325 meters, Fitzsimmons Hospital, 1,500 miles.
Detroit, Mich., WCX, *Free Press* (new, May 5, 1922).
Detroit, Mich., WWJ, 360 meters, *Detroit News*, 1,500 miles.
Fort Worth, Tex., WPA, 360 and 475 meters, *Fort Worth Record*, 1,000 miles.
Fort Worth, Tex., WBAP, *Star-Telegram* (new, May 5).
Hamilton, Ohio, WRK, 360 meters, Doron Bros., 1,400 miles.
Hartford, Conn., WQB, C. D. Tuska Co.
Indianapolis, Ind., WLK, Hamilton Mfg. Co.
Jersey City, N. J., WNO, 360 meters, Wireless Telephone Co.
Jersey City, N. J., 21A, 200 meters, *Jersey Review*, 950 miles.
Kansas City, Mo., WOQ, Western Radio Co.
Lincoln, Neb., 9YY, 375 meters, State University, 1,200 miles.
Los Angeles, Cal., KHJ, 360 meters, *Los Angeles Times* (new).
Los Angeles, Cal., KOG, Western Radio Electrical Co.
Los Angeles, KYJ, 360 meters, Hamberger, 1,000 miles.
Los Angeles, Cal., KHJ, 360 meters, *Los Angeles Times* (new).
Madison, Wis., WHA, 360 and 485 meters, University of Wisconsin, 1,000 miles.
Medford, Hillside, Mass., WGI, 360 meters, American Radio Research Co., 1,000 miles.
Minneapolis, Minn., WLB, University of Minnesota.
Newark, N. J., WJZ, 360 meters, Westinghouse Company, 1,800 miles.
Newark, WOR, 350 meters, Bamberger's, 300 miles.
Newburgh, N. Y., WCAB, *Newburgh News* (new, May 5).
New York, N. Y. (Bedloe's Island), WVP, 1,460 meters, U. S. Signal Corps.
New York, N. Y., WWZ, 360 meters, Wanamaker's Department Store, 1,400 miles.
Oakland, Cal., KZY, A. & B. Radio Supply Co.
Oakland, Cal., KZM, 360 meters, Hotel Oakland, 1,900 miles.
Oakland, Cal., KLX, *Oakland Tribune* (new, May 5).
Omaha, Neb., WOU, R. B. Howell.
Pasadena, Cal., KLB, 360 meters, J. J. Dunn & Co., 600 miles.
Pawtucket, R. I., IXAD, 290 meters, Standard Radio & Electric Co., 400 miles.
Philadelphia, Pa., WIP, 360 meters, Gimbel Brothers, 1,000 miles.
Pittsburgh, Pa., KDKA, 360 meters, Westinghouse Co., 2,000 miles.
Portland, Ore., KSW, 360 meters, *Oregonian*, 900 miles.
Richmond, Va., WBAZ, *Times-Dispatch* (new, May 5).
Sacramento, Cal., KQV, 360 meters, J. C. Holbrecht, 1,000 miles.
San Francisco, Cal., KDN, Leo J. Meyberg Co.
San Jose, Cal., KQW, 360 meters, C. D. Herrold, 1,500 miles.
Schenectady, N. Y., WGY, 360 meters, General Electric Co., 1,600 miles.
Seattle, Wash., WJO, 360 meters, Northern Radio Electric Co., 1,200 miles.
Springfield, Mass., WBZ, 360 meters, Westinghouse Co., 1,400 miles.
Stockton, Cal., KWG, Portable Wireless Tel. Co.
Toledo, Ohio, WDZ, Marshal Gerken Co.
Washington, D. C., WDN, Church of the Covenant.
Washington, D. C., KQV, Doubleday Hill Electrical Co.
Washington, D. C., White & Boyer, 1,000 miles.

[illegible]ration of Electrical Units. First [illegible] series, which will discuss principles of construction and operation of the various units of automotive electrical systems. This one starts with the elements, considering magnetism, then passes on to types of magneto magnets, and concludes with a series of questions and problems concerning these elementary principles. Designed primarily for the shop man, who should get much benefit from the series. J. R. BAYSTON, *Amer. Garage and Auto Dealer*, 4-22, 2900 w. MAH.

Electric Safety Lamp. Methods used by Bureau of Mines for testing lamps for approval. Increased use due to following facts: Reduce hazard of gas explosion and burns; increase miner's efficiency because of good illumination; reduce risk of fire in mine; reduce accidents from fall of rock, etc.; reduce haulage accidents and accidents in handling explosives; increases opportunity for escape after explosion; relieves miners' eye-strain and improves health because of purer air, always keeps cool, does not go out when overturned, easily cleaned, reliable. Flame safety lamp should be used in conjunction with electric lamps, in order to test for methane. Discussion of various types of lamps approved by Bureau of Mines. Table gives detailed data of different makes of lamps. W. G. BURROUGHS, *Coal Industry*, 4-22, 2500 w. CJW.

Simplified Automatic Substation Control. Description of the single unit substations which are economically located and equipped with new type of simplified full automatic control. These have proved to be of great advantage. Various apparatus used in these automatically controlled substations is described. Load is controlled without the use of resistances. The housing space required is very small and there is no basement necessary. Voltage drop was cut by one-third. V. E. THELIN, *Electric Traction*, 4-22, 6000 w. IG.

Practical Hints on Phantom Circuits. Discussion of the principles underlying the use of such circuits. The requisites of a satisfactory repeating coil are described. Practical application and maintenance. Repeating coil should have perfect balance, high talking efficiency, high ringing efficiency, high insulation and high resistance. R. V. ACHATZ, *Telephony*, 5-6-22, 5000 w. IG.

The Use of Slip-Ring Induction Motors and Synchronous Motors in Cement Mills. Description of the special type of motors that are used in the operation of the various machines in a cement mill. Special features of the design are indicated. H. W. ROGERS, *J. Am. Inst. Electr. Engrs.*, 5-22, 3200 w. IG.

Electric Locomotive for Chile Freight Service. Besides two types of passenger locomotives to be used on the newly electrified State railways of Chile, South America, two types of freight locomotives are to be used, one for heavy road service and a lighter form for switching. This article describes the two latter, the heavy unit in more detail than the lighter. These are combination Baldwin-Westinghouse outfits, the latter company installing the electrical and air-brake equipment on the locomotive firm's framework. They are to be put into service on the main line between Santiago and Valparaiso, 116 miles long, and on the branch line between Las Vegas and Los Andes, 28 miles. The heaviest grade is on the latter, 2.25%, and 12 miles long. Dimensions, weight, assembling details are given and numerous illustrations and drawings show all these data. F. E. WYNNE, *Electric Railway Jour.*, 4-22-22, 3400 w. MAH.



The Present Use of Power in the Superzone

Each dot represents 10,000 horsepower, and therefore 25 separate power plants, as 79% of power plants are of less than 500 horsepower. It is proposed to provide power enough—in the form of electric current—for all these establishments from 273 stations electrically connected. Waterpower will be utilized from the Potomac, the Susquehanna, the Delaware, the Hudson and the Connecticut Rivers and their tributaries; eventually also from the Black River, the Raquette, the St. Lawrence, and from Niagara Falls. But most of the current will be generated from coal in those localities where coal is cheapest, and some existing plants will be utilized and enlarged.—*(Forbes Magazine.)*

Electric Furnace Iron and Steel. In Treadwell, Alaska, cast iron is made more cheaply in electric furnace than in cupola. Analyses show that from all-scrap cupola-melted iron, electric furnace product produces metal of greatly reduced sulfur content. Factors affecting economy of melting and advantages of electric furnace in foundry practice discussed. Average power consumption for 25 consecutive heats of iron and steel, with 2-voltage control, shows saving of 75 kwh. per ton of iron and 42 kwh. per ton of steel when using dual voltage. W. E. CAHILL, *Trans. Am. Electrochem. Soc.*, 1922, 5 pp. CJW.

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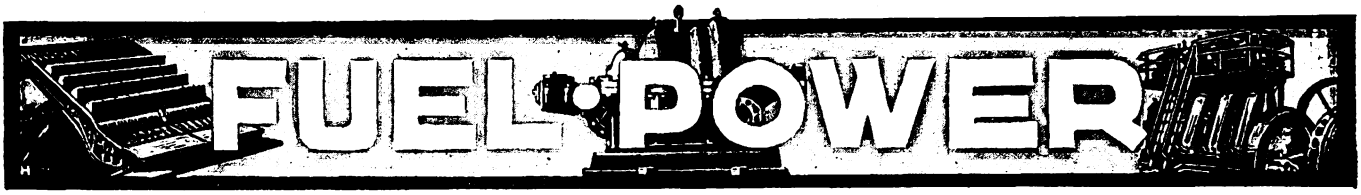
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Electric Mine Signals. Three types, battery, magneto and power. General discussion of these systems, with necessary precautions, methods of testing for faults, and for telephone troubles and their correction. Illustrated. T. CROFT, *Coal Industry*, 4-22, 2500 w. CJW.

Magnetic Clutches in the Cement Industry. History of the use of the magnetic clutch in various industries. Details of its operation. Application to tube mill grinding. Simplicity of mechanical design is one of the most pronounced features of the magnetic clutch. W. H. COSTELLO, *J. Am. Inst. Electr. Engrs.*, 5-22, 3500 w. IG.

Electric Brakes Steel Mills. Most desirable practice is to retard and stop loads electrically by dynamic braking and to use friction brake for holding. Various types of electrical brakes. Disc brake, shoe-type brake gravity set and solenoid release, or spring set and magnet release; also brake for graduated braking on alternating currents. GORDON FOX, *Blast Furnace & Steel Plant*, 5-22, 6 Figs., 4000 w. APS.

Radio Apparatus—What It Is Made of. Description of various raw materials entering into the construction of radio apparatus. *Raw Material*, 5-22, 10,000 w. IG.



Solutions for Coal Industry Problems

IN the opinion of the *Gas-Age Record,* there are two solutions of the basic problems responsible for the frequent strikes in the coal industry. The first is the appointment of a bureau of coal economics authorized to collect and disseminate coal statistics of all kinds. The second is the application of engineering skill and scientific knowledge to the coal industry in order to secure the profits of the operators, insure a greater annual income to the miners and supply fuel at a lower cost to consumers. At the present time less than 200 lbs. on the average out of every ton of coal mined is converted into useful work, and it is pointed out that the coal industry must follow in the steps of the meat packers and start to refine coal and save the by-products.

That such action may be forced by competition between operators after the strike is settled, is the belief of a writer in the *Black Diamond* who predicts that under present conditions only the most efficient operators will survive. He goes on to say that although the public wants lower coal prices it is to be questioned whether merely a reduction in miners' wages and freight rates on coal will prove satisfactory—in view of the other uneconomic practices in the industry that demand attention.

Smokeless Fuel for Salt Lake City. Installation of by-product plant of sufficient size to supply entire domestic demand of Salt Lake City for fuel is not economically feasible unless municipal legislation prohiting production of smoke is obtained. By education and legislation consumers must be induced to pay $3 more per ton for smokeless fuel than for ordinary bituminous coal in order to make carbonization plant success. Means which should be considered for alleviating nuisance are: sale of available supply of gas-house coke, briquetting coke breeze from beehive ovens at Sunnyside for domestic fuel, burning powdered coal where feasible, installation of semi-experimental 100-ton plant for low temperature carbonization and continuation of educational campaign to teach domestic consumers proper methods of firing native coal. G. St. J. Perrott and H. W. Clark, *Reports of Investigations, Bureau of Mines,* No. 2341, 18 pp. CJW.

Coke-Oven Construction. Assuming proper selection of brick, advantages of silica brick for oven construction are: Resistance to corrosion where salty coals are coked; possibility of increased output because of higher thermal efficiency; greater durability, more particuarly under high temperature coking conditions. When non-salty coals are used, satisfactory oven is obtained by use of either fireclay or semi-silica bricks under normal temperature conditions of present British practice. Salt, however, causes corrosion of both these types of brick. W. J. Rees, *Coal Trade Bull.,* 5-1-22, 1500 w. CJW.

Refuse as Fuel. With increasing price of fuel, practice of burning shavings and other refuse becomes more important. Excess of air formerly used to blow shavings reduced efficiency of combustion. Draft necessary for coal too strong for shavings and resulted in blowing much of refuse up chimney. Result of tests indicate that coal should be burned by itself and shavings by themselves in special furnaces, always aiming to use smallest number of boilers that will handle waste. Safety of operation must be considered. Description of boiler rebuilt to provide means of burning shavings and refuse efficiently. Einar Winholt, *Power Plant Engineering,* 5-15-22, 1200 w. CJW.

Injection and Combustion of Fuel-Oil. It takes experiments with solid injection and air-blast in marine Diesel engines. Author, prominent British naval authority, describes the earlier experiments, the conclusions drawn from them, and the final experiments which proved them. He mentions the fact that he has dealt altogether with the high-speed engine, but believes his conclusions applicable with equal force to the slow-speed type. C. J. Hawkes, *Motorship,* 5-22, 3200 w. MAH.

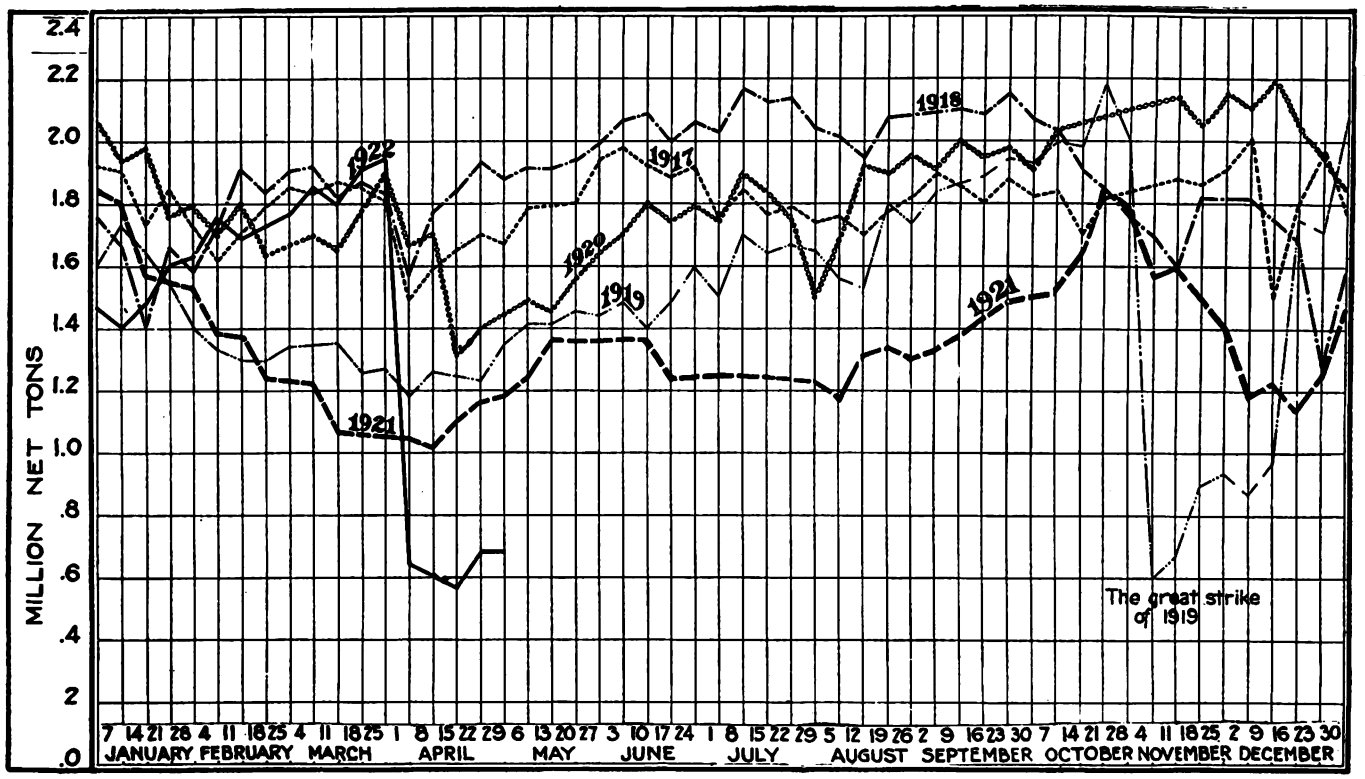
British Oil-Cooled Car Engines. Description of two new English car engines which have the lubricating and cooling systems combined into one. The crankcase is carried up around the cylinders and a much larger amount of oil is used, and is forced around through the system at a very rapid rate. This serves the double purpose of cooling and lubricating, saves weight in many ways, and eliminates a number of parts. Originally designed for use on motorcycles, it has been found so successful that it is now applied to two and four-cylinder cars, and several large makers have taken it up quite seriously. Higher efficiency is claimed, lighter weight, lower cost of production and greater ease of maintenance, all factors which bulk up large these days. The article describes and illustrates several of the engines. M. W. Bourdon, *Automotive Industries,* 4-20-22, 2300 w. MAH.

Demonstration of Deutsche Werke Engine. This is a new Diesel marine engine of 950 shaft horsepower, manufactured at Kiel. It is of the 4-cycle type, with cross head, is single acting, direct reversible, has 6 working cylinders arranged in a line with two 3-stage air compressors. The latter are driven by rocking levers off the cross heads, and have the high-pressure stage at the bottom. The main cylinders have a bore of 19.685 in., a stroke of 35.433 in., and develop 1280 indicated or 950 shaft horsepower at 135 r.p.m. Other details are given of the design and construction, with working drawings and photos, also details of the 7-day test. *Motorship,* 4-22, 2150 w. MAH.

Thyssen-Holzwarth Oil and Gas Turbines. For years engineers and designers have worked toward a combination of the gas engine and the turbine, believing that the high speed of explosive gases is particularly suitable for turbine use. The tremendous temperatures have been an obstacle, and there have been many others, theoretical and practical. Two forms are now being produced commercially, however, the French Armengand and Lemale, and the German Holzwarth. This article is concerned with the latter, as it is being constructed by the Maschinenfabrik Thyssen, Mulheim Rühr. Author claims that this form is superior thermodynamically to the other, and further that it has surpassed the steam turbine, and tests now under way show a tendency to increase the efficiency and economy toward the standard of the gas piston engine of the Diesel type. The article describes and illustrates a number of the Thyssen-Holzwarth products, notably a 500-h.p., a 1000-h.p., and two 1500-h.p. units. Prof. W. Schüle, *Motorship,* 5-22, 2100 w. MAH.

The Still Engine. The principle of design of the combined Diesel-steam plant is generation of power through use of oil consumed within cylinder for the down stroke, steam produced by heat recovered from exhaust gases through medium of re-generator or boiler forming supplementary source of power for use on up-stroke on lower side of piston. Fundamental principle is recovery of heat from waste products of combustion and utilization of that heat in engine itself for development of power. These engines give lower fuel consumption per brake horsepower, have lighter weight per unit of power and occupy less space than any other known type of heavy-oil engine. System may be applied to either 2- or 4-stroke internal combustion engines. Present paper considers only single-piston type working on 2-stroke port-scavenging principle. *Motorship,* 4-22, 1200 w. CJW.

An American Development in Large-bore Aircraft Engines. The newest product of the Wright Aeronautical Corp. is a six-cylinder engine having a bore of 7 in. and a stroke of 8 in. It develops 400 hp. at 1400 r.p.m. The engine weighs 1320 lbs. dry and the jackets hold 38 lbs. of water, so that the modern tendency away from extreme lightness is shown, this being approximately 3.3 lb. per hp., as compared with 2.2, which has been attained in the Liberty, and 2.1 in the largest Fiat unit. The article describes the engine thoroughly, giving large drawings and many photographs Herbert Chase, *Automotive Industries,* 4-20-22, 2500 w. MAH.



Estimated Average Total Production Per Working Day of Bituminous Coal, Including Coal Coked.—*(Retail Coalman.)*

Measurement of Superheat. Use of superheat becoming more general wherever economy of steam-driven apparatus is considered. Measuring superheat not difficult. Ordinary mercury and glass thermometer commonly used, registering as high as 575° F. Above this, nitrogen-filled instruments are used. Metal bulb filled with mercury vapor used where permanent fitting is desired. Third type is electric resistance thermometer, based on increase of electrical resistance of certain metals with temperature. Thermometer should be placed so that readings will not be affected by heat radiated from boiler furnaces or by colder parts of machine. Thermometer ordinarily placed in thin steel cup or well partly filled with mercury or good mineral oil. Thread of mercury should come just above cork stopper if possible to avoid stem correction. B. O. SNYDER, *Power Plant Engineering*, 5-15-22, 750 w. CJW.

Commercial Development of Gas Uses. Campaign concentrating upon intensive development of use of gas for water heating. Possible that this may be used to fill in valleys produced by house-heating business during winter. Urges importance of selling only quality merchandise, Standard Gas Appliance Specifications being used. Aggressive sales policy backed up by equally aggressive advertising program is combination needed by industry. O. H. FOGG, *Gas Age-Record*, 5-20-22, 2500 w. CJW.

Distilled Water Ice Plant. Watch small items to avoid shut-down. Steam condensers first to be considered. Excess condenser capacity should be provided. Circulate just enough water to prevent condensers from blowing hard. Flat coils next demand attention. Water should leave these coils as cool as possible. Use cold water direct from wells or other source of supply. Every degree water is reduced saves refrigeration. Steam out coils only when oil begins to show on water entering forecooler. Transfer of heat from water to ammonia is more effective in forecooler than in ice tank. Water line from forecooler to can filler hose should be insulated. A. G. SOLOMON, *Power Plant Engineering*, 5-15-22, 1500 w. CJW.

Synthetic Gasoline Process. It is claimed that only 5% of the crude oil is made into gasoline, while it is possible to convert 30% of it into motor fuel. Most important processes for the production of gasoline are vapor phase system, pressure distillate system, chemical methods and synthetical crude systems. By far the greatest possibilities are presented by the latter process in reducing operating costs. Three types of the synthetic crude system are indicated. Comparative costs of the different methods are given to prove contention that the synthetic crude system is the cheapest. Various precautions are pointed out that must be followed in the operation of a plant using this method. Apparatus used is simple and can be added easily to existing plant. R. CROSS, *Petroleum Record*, 4-22, 1500 w. IG.

Modern Blasting Methods. Explosives are placed in hands of specially trained men, whose duty it is to see that holes are properly drilled, loaded and fired. Permissible explosives have been developed by Bureau of Mines, so that almost any combination is now available. High pay encourages speed and results in increased dangers of explosion and production of very poor grade of coal. Selection of explosives of primary importance. Scientific instead of haphazard. Shot-firing supervision is necessary. Five systems described as modern. Advantages and disadvantages of these given. Differences between black powder and of permissible powder, a high explosive, makes necessary to drill holes differently and sometimes to fire shots in different rotation. Also advisable to make some changes in loading and stemming of holes when changing. Permissible explosives have reduced accidents and make working in mine more pleasant. A. E. ANDERSON, *Coal Industry*, 4-22, 3000 w. CJW.

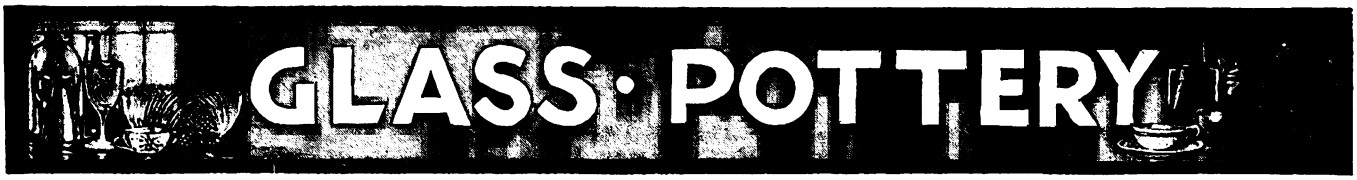
Utilization of Bituminous Coals. Examination of coal includes ultimate analysis, proximate analysis, microscopic examination in thin sections, solvent action, progressive carbonization, and extraction of resins by inert heating medium. In selection, coals of extreme composition respecting volatile contents should be brought within range of 20-30%. Process factors comprise heat and pressure control, atmospheric variations and control, type of distillate, its amount and temperature release, form and state of charge. Use of pressure more important on by-product side than on coking. Suction densifies coke. Form of charge important in determining conductivity and incidence of heating temperature required in relation to other factors. State of charge important, in that dry charges require slower heating, followed by more rapid, whereas vice versa with wet charges. Discussion of function of resin in coal. W. E. DAVIES, *Gas Age-Record*, 5-13-22, 2500 w. CJW.

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Glass Required for Automotive Industry

THE increase in the production of automobiles is expected to have a beneficial effect upon the glass industry, according to the *National Glass Budget*. Plate glass, especially, will be in demand. Some idea of the quantity of plate glass that will be required this year may be gained when it is considered that the average requirements of each of the 1,800,000 automobiles to be manufactured will be 15 sq. ft. of glass—which would mean that 27,000,000 sq. ft. will be used in new cars alone. This does not provide for the large amount of replacement glass equaling about 20% of the original amount.

A large amount of glass will also be used for the various types of lenses in the headlights and the danger and stop lights at the rear of the car. It is pointed out that the average instrument board has at least one circle of glass covering some indicator. Many of the larger types of cars have as high as five or six circles. A reasonable average would be three to every car, or 5,400,000 circles for the total to be produced in 1922. Also at least 8,000,000 small electric light bulbs will be required. A large number of mirrors will also be used, since in a number of the larger cities automobiles must be equipped with a side mirror to warn the driver of approaching danger.

Analysis of Scientific Glasses. In analysis of more complex glasses it is preferable not to work through series of operation with one portion of sample, but several portions and one isolated one, or groups of constituents by suitable methods, which results in greater accuracy without increasing time needed for complete analysis. For estimation of silica, alumina, iron oxide, zinc oxide, lime and magnesia, it is necessary to first eliminate boric acid, if present. After fusion of sample with anhydrous sodium carbonate, fused mass is treated with hot water and hydrochloric acid, as in analysis of common glass. During evaporation of silica, add methyl alcohol saturated with dry hydrochloric gas. Repeat with this reagent until boric acid is removed. Filtrate from silica is heated, and gassed with hydrogen sulphide to remove lead, arsenic and antimony, if present. Precipitate is dissolved in nitric acid, and lead estimated as lead sulphate. Filtrate, and precipitate iron and aluminum with ammonia, dissolve precipitate in hydrochloric acid and reprecipitate. Filtrate from hydroxides is acidified with formic acid and gassed with hydrogen sulphide, which precipitates zinc as sulphide. In the filtrate calcium and magnesium are estimated as usual. J. B. KRAK, *Glass Industry*, 5-22, 2000 w. MBB.

Need of Care in Handling Glass Melting Pots. Clay pots should be placed in cold patch arch, not into one which has just been emptied and walls of which are still very hot and will heat the pot too rapidly. Matter of heating up pots needs much attention. Pots should be brought to maximum temperature and allowed to remain there until an even temperature throughout pot is obtained. This temperature should be 2100° F. to 2200° F., but many pot arches never attain this temperature. Care should be taken that blocks do not set too close to pot at time of building up wall, so that flames may circulate about pot during melting and working periods. It is advocated that pots be placed in furnace, stopper removed and that blocks be built up on breast blocks, encasing entire pot, including hood, in furnace and left for 15 hours. HENRY W. HESS, *Glass Worker*, 4-15-22. AMC.

Warm and Cool Color. A simple classification of colors is warm and cool. Majority of people like warm color schemes in preference to cool, as red ray of light is sharpest, causing more intense reaction upon optic nerve. Success of color scheme depends on amount of color used. This is determined by appreciation rather than rule. Colors must produce harmony, no color standing out alone in the design. Every warm scheme should have enough cool color to balance and enhance warm colors, yet avoiding too definite feeling. MARIE RIGGINS, *Keramic Studio*, 5-22, 500 w. MBB.

Lacquer Ware. Origin of lacquer is obscure. Undoubtedly first used in China as a preservative. Made from sap of lac trees cultivated throughout southern and central China. Trees are tapped once every seven years; sap which is white hardens as comes in contact with air. Juice is ready for coloring and application after refining by heating and straining. Floating lacquer on article requires skill. Put on too thin produces wavering, uneven surface; too thick coat will blister. Number of applications and intervening polishings vary from three to eighteen or more. ALBERT W. HECKMAN, *Keramic Studio*, 5-22, 900 w. MBB.

Pots Used in Optical Glass Manufacture. For potical glass, porcelain type pot is better than fire clay pot because of its increased density, uniformity, low iron content. In porcelain pot, refractoriness sacrificed somewhat to obtain density. Cast porcelain pot is denser, less refractory than handmade pot of same batch composition. Great care required with cast pots to select pot batch refractory enough at desired melting temperature, yet dense enough withstand excessive attack from glass. The effect of chemical composition has not yet been fully established. R. J. MONTGOMERY and M. R. SCOTT, *Glass Industry*, 5-22, 800 w. MBB.

Window Glass and Its Glazing. Two things essential to perfect job sash glazing—properly primed sash and good putty. Covers various qualities of glass and best methods of glazing. A. ASHMUN KELLY, *Building Age*, 5-22, 500 w. CS.

The Glorious Glass of Venice. Though art of glassmaking came to Italy from other countries, record shows old Romans had famous glass factories early as 54 B.C. Examples of this early work still inspiration, as quality of work never has been equaled. Venetian blown glass, always renowned for beauty of form and color, began to assume great importance in fourteenth century; after sixteenth Venetians ceased to make enamled glass after Arabian style, but manufactured absolutely colorless, transparent glass, blown to thinness of a wafer, later coloring it. From 1500 to 1550 the art was at its height, followed by fall of Venetian Republic and slump in art. In 1856 revived, and Murano, glass center, became again leader of industry. PAGE EATON, *Gift and Art Shop*, 5-22, 1000 w. MBB.

Making Colorless Glass in Tank Furnaces. Selenium considered most suitable agent for eliminating harmful discolorations in production of colorless glass, added either in form of elementary material, or as salt containing selenium, such as sodium selenite or selenate, the last being rarely used. Decolorizing effect apparently due to influence of selenium, whether as elementary selenium or reduced salts. *(Con'td.) Glass Worker*, 4-29-22, 1000 w. MBB.

Cleaning Producer Gas without Washing. Feasible to clean raw producer gas, retaining sensible heat of gas, in addition to saving B.t.u. value of tar and volatile hydrocarbon. Possible accomplish this without additional operating cost by means of a gas equalizer and soot collector, developed to treat gas from bituminous coal. Advantages of installation includes 20% to 25% saving on fuel, increased, improved quality production, saving in gas valves, less brickwork, labor and repairs; less labor in cleaning out soot each week, more continuous operation furnaces. JAMES H. MATHESON, *Glass Industry*, 5-22, 700 w. MBB.

What Proper Control of Pot Furnace Conditions Can Mean. Saving of the life of furnace and far better quality of glass at all times is possible from absolute control of temperature of fuel in pot furnace in glass factories. HENRY W. HESS, *Glass Worker*, 5-6-22, 2000 w. MBB.

IRON·STEEL

Electric Cast Iron

THE future undoubtedly belongs to electric cast iron. Where the weight of castings made is small or where an especially high grade of iron is desired for perfect castings the electric furnace in the near future is likely to prove economical. The tendency in all fields is toward products which are more uniform and closer to standard specifications. Cast iron forms no exception. The well-known dephosphorizing and desulfurizing action of the electric furnace, especially with basic lining, and the high degree of fluidity attainable simultaneously indicate that, other things being equal, an attempt *must* be made to render it available for the foundry.

The development of the electric furnace for cast iron is, of course, only in its initial stages, but the attractive possibilities of obtaining a high-grade product under easily regulated conditions will soon find a response in the efforts of designers and builders of electric furnaces, and the next few years are certain to see considerable development in this direction, paralleling the rise and development of electric steel.

Factors Influencing Sheradizing. Series of experiments made in which each of these factors was varied, while the others remained constant, so as to determine what effect each had on the results of the process. First, it was desired to determine whether different grades of iron will sheradize at same rate. Little difference was found in the rates of deposit at temperatures below 400 C. At 430 C. rates upon cast iron and malleable iron was greater than upon iron with lower carbon content. Very thick coatings of zinc metal were obtained on cast and malleable iron only at temperatures above the melting point of zinc and in dust rich in zinc. Experiments were made to ascertain the reason for the same. It was found to be due to the silicon content of the iron. Silicon induces the rapid growth, but it was not proven that cast iron free from silicon would not act similarly. Iron in the zinc dust up to 2% causes a slight increase in the rate of deposit. At 4% the rate is about the same as when no iron is present. Beyond 4% the rate falls rapidly and at 10% it becomes zero. Cadmium, antimony, and copper in the zinc dust cause slight increase in the rate of deposit. Aluminum and lead have the opposite effect. L. McCULLOCH, *Elec. J.*, 4-22, 4500 w. IG.

Selecting a Grinding Medium for Tube Mills. Now that the quantity of work done by ball and tube mills has become large, the smaller parts of the machinery are attracting greater and greater scrutiny as to their fitness for the work. This author takes up the selection of balls, deciding against cast-iron balls because of their brittleness, for steel balls because they hold their polished surface, and for forged steel balls for all-around results. Next he takes up the effect of mill speed on the wear of the balls, practical uses of grinding balls with reference to special shapes for special services, and other relevant matters. NEWTON L. HALL, *Rock Products*, 4-22-22, 1900 w. MAH.

Development of the Fluorspar Industry. This is one of the products emphasized by the war. Little known before, the great demand for steel, in which it is an important flux, and for acids caused and tremendous increase in its production. This article describes the material, where and how it is found, how mixed or excavated, how it is milled or handled after being taken out of the ground, how it is screened and classified, and how sold. The author describes also the explorations for new deposits. Further, he argues for continuous purchases by steel makers, with the idea that a continuous or constant output would encourage and stabilize operations in this non-metallic mineral. J. M. BLAYNEY, *Cement, Mill and Quarry*, 3-22, 4100 w. MAH.

Change in Dimensions of High-Speed Steels in Heat Treatment. Change in length was measured. Tables show original length, as quenched, as drawn at 300, 500, 700, 900 and 1100° F. and as annealed. MARCUS A. GROSSMANN, *Amer. Soc. for Steel Treating*, 5-22, 1800 w. APS.

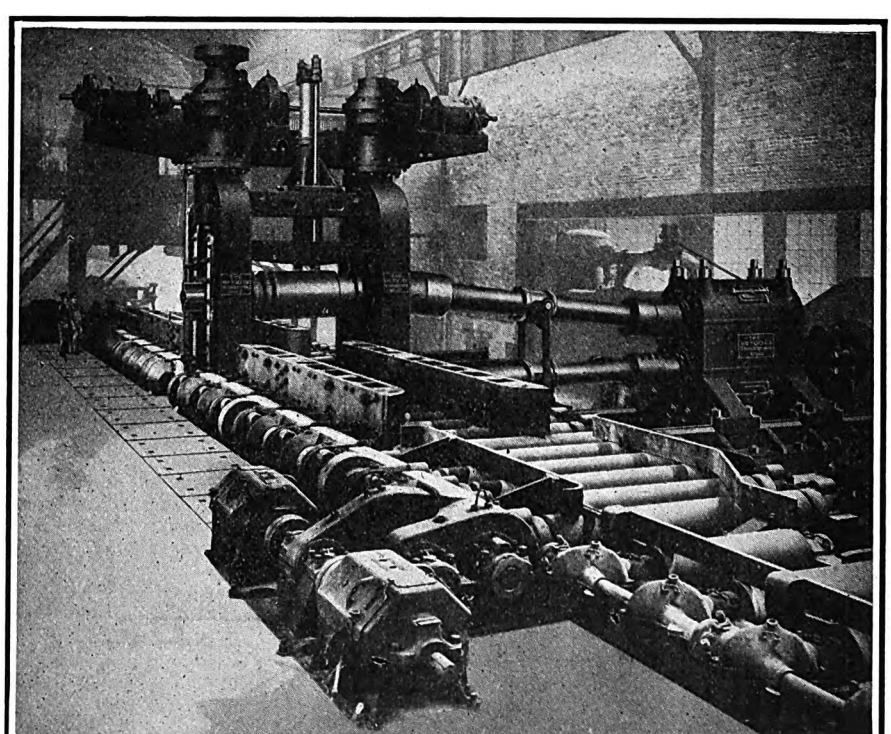
Synthetic Cast Iron. Production consists of melting steel scrap or combinations of iron and steel scrap, in acid or basic electric furnace, with highly carbonaceous material (coke, oil still residue, etc.), to give necessary carbon content to iron, and making adjustments in percentages of manganese, silicon, sulfur and phosphorus to give desired characteristics in finished metal. Examples of charges are given, and also methods of adjustment of analysis. Quick testing method, using Brinell testing machine, has been devised. Has most useful field, in localities like Pacific coast, distant from fuel and pig-iron supplies, but with low power. Most immediate and logical application in production of castings. J. L. CAWTHON, *Proc. Am Electrochemical Soc.*, 1922, 12 pp. CJW.

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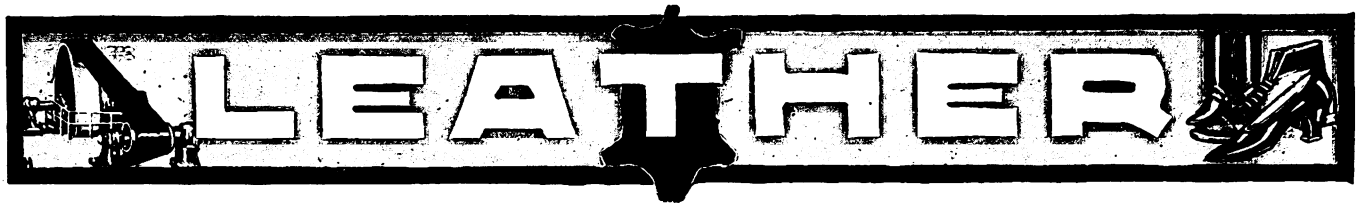
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The buds that come from this blooming mill in the Brier Hill Steel Co. may not be as beautiful as "the flowers that bloom in the spring," but they are generally more useful.—(Photo courtesy *Iron Trade Review*).



Lynn, Brockton and—St. Louis

IS the boot and shoe industry likely to follow the lumber industry and other important basic industries westward? A comparison of the conditions governing manufacture in the East and in the Middle West indicates that there are a number of factors favoring production in the Middle West. First, the Middle Western States are closer to the source of raw material. The Western hide markets are nearby and the hides imported from South America may be transported at much less expense up the Mississippi than by freight to the East. Tanbark and tanning extract are secured chiefly from South Carolina and other Southern States which are closer to the Middle Western production centers.

The position of the West in regard to markets is also advantageous. The center of population, once located near the Eastern seaboard, has moved until it is now in the locality of Cleveland.

Labor conditions are more favorable to manufacturers in the Middle West because there is a plentiful supply of non-union labor, while in Massachusetts and the New England States labor is strongly organized and wages are considerably higher. The cost of land and of building, both in regard to materials and labor, are also cheaper in the West, which makes for lower rentals and generally lower overhead costs.

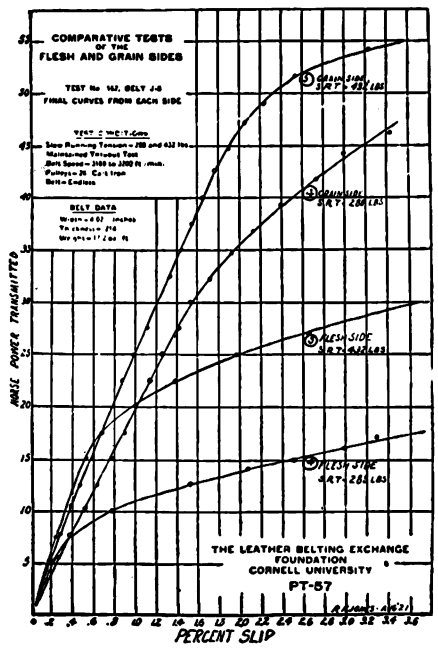
Too Many Shoe Styles

IN the opinion of a writer in *The Shoe Retailer,* there is no profit for either shoe manufacturer or retailer in continuing to offer a wide variety of styles. The mere changing of styles will not influence people to buy more pairs of shoes, and although it may be possible for a few large city stores to operate successfully under this system, for the smaller dealers it means ruin, since their profits would be tied up in stock several months old and out of date.

Reducing the number of styles, however, does not mean that stores should return to the old "no-style" shoe days. Should such a policy be adopted, it is predicted that half the retail stores would close up and the other half pay only a living salary to their owners under present-day expenses. But both manufacturers and dealers must realize the uselessness of trying to play the style game with the same insistence during slack periods as in prosperous times.

The problem of handling style shoes profitably would appear to be one that must be solved by each individual dealer. According to *The Shoe Retailer,* the only safe course for him to pursue is to put aside a buying budget and divide it into three classes—staple, semi-staple and novelties—putting into the stock the right proportion of these three divisions, based on the line of customers he has established.

Lime Liquor in Tannery. Application of theories of Proctor and Wilson and of Loeb to alkaline swelling of hide in lime liquors. Real reason why such "sharpening" agents as sodium sulfide and sodium carbonate produce greater swelling is that osmotic pressure of sodium collagenate is greater than that of calcium collagenate at the same hydrogen ion concentration. Smooth grain of skins unhaired by arsenic sulfide is due to fact that only calcium collagenate is produced. Alkaline swelling is shown to be exactly analogous to acid swelling, which has been much more extensively investigated, and certain tanning processes are shown to act in parallel way to acid pickling. W. R. ATKINS, *J. Ind. Eng. Chem.,* 5-22, 2000 w. CJW.



Grain side to pulley is best for leather belting. See digest "Grain Side to Pulley. . . ."

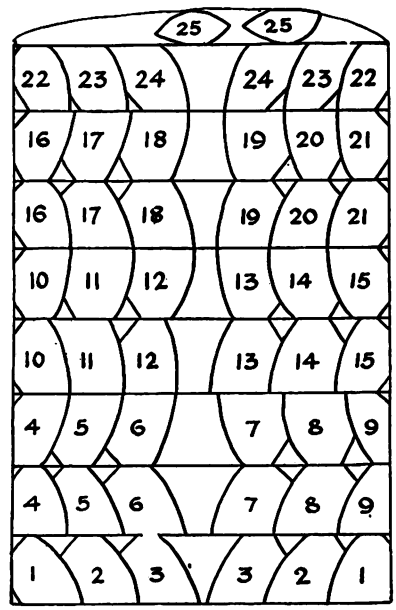
Grain Side to Pulley Is Best for Leather Belting. Method of making tests and results obtained. From data obtained there is no doubt but that there are distinct advantages in power transmission to be had from running leather belts with grain side to pulley. T. W. STEERE, *Fibre and Fabric,* 4-11-22. AS.

History of Conveying Belts. I. Story of development of the industry of conveying belts. The part Thomas Edison played in this development is told. T. ROBINS, *India Rubber World,* 4-22, 2000 w. IG.

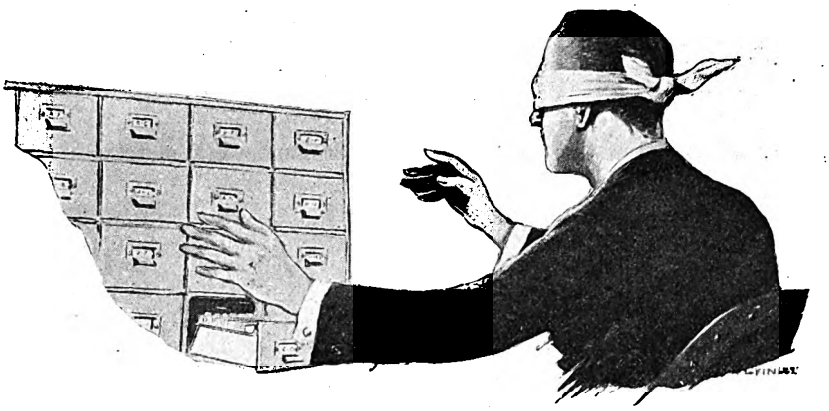
Industrial Lighting. Defective illumination in workrooms and defective sight among workmen are jointly responsible for industrial waste of enormous total. Both of these factors are within control of modern employer. Their correction assures positive increase of production, and at disproportionately low cost, aside from humanitarian considerations. With all modern improvements in lighting equipment and eyeglasses, hosts of workmen are still laboring in semi-darkness. *Industrial Power,* 5-22, 1500 w. CJW.

The Trend in Heels. Higher heels are becoming vogue. Low heels manifested interesting psychology—the desire for feminine comfort and health, and the vogue among "flappers," who mostly demanded the "boxwood" or covered military, about an inch high. It is believed the future popular heel for street and evening wear will be about two inches high. Style change is slow; appears to be toward simplicity. *American Shoemaking,* 5-24-22, 1000 w. WRB.

Leather Measuring Devices. Author reviews uses of leather; 681 leather manufacturers in 1920, with output valued at $829,688,200. Largest number in Massachusetts. Of output about three-fourths, or 1,157,818,200 sq. ft., sold on area basis. Inaccurate measurement methods produced large losses to most manufacturers, showing need for measuring devices, which author describes. Test of ordinary measuring methods with use of accurate devices showed variance of approximately three feet per dozen skins. Article of much value to all leather producers. *American Shoemaking,* 5-24-22, 4500 w. WRB.



How a Richmond, Va., shoe man cuts 25 pairs of half soles from a single bed.—*(Shoe Repairer).*



Doing Business Blindfolded

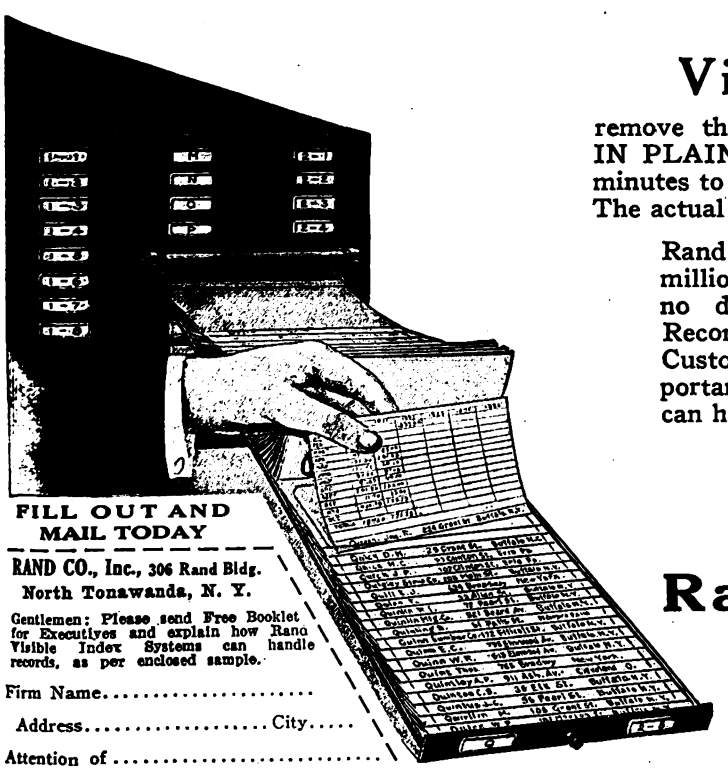
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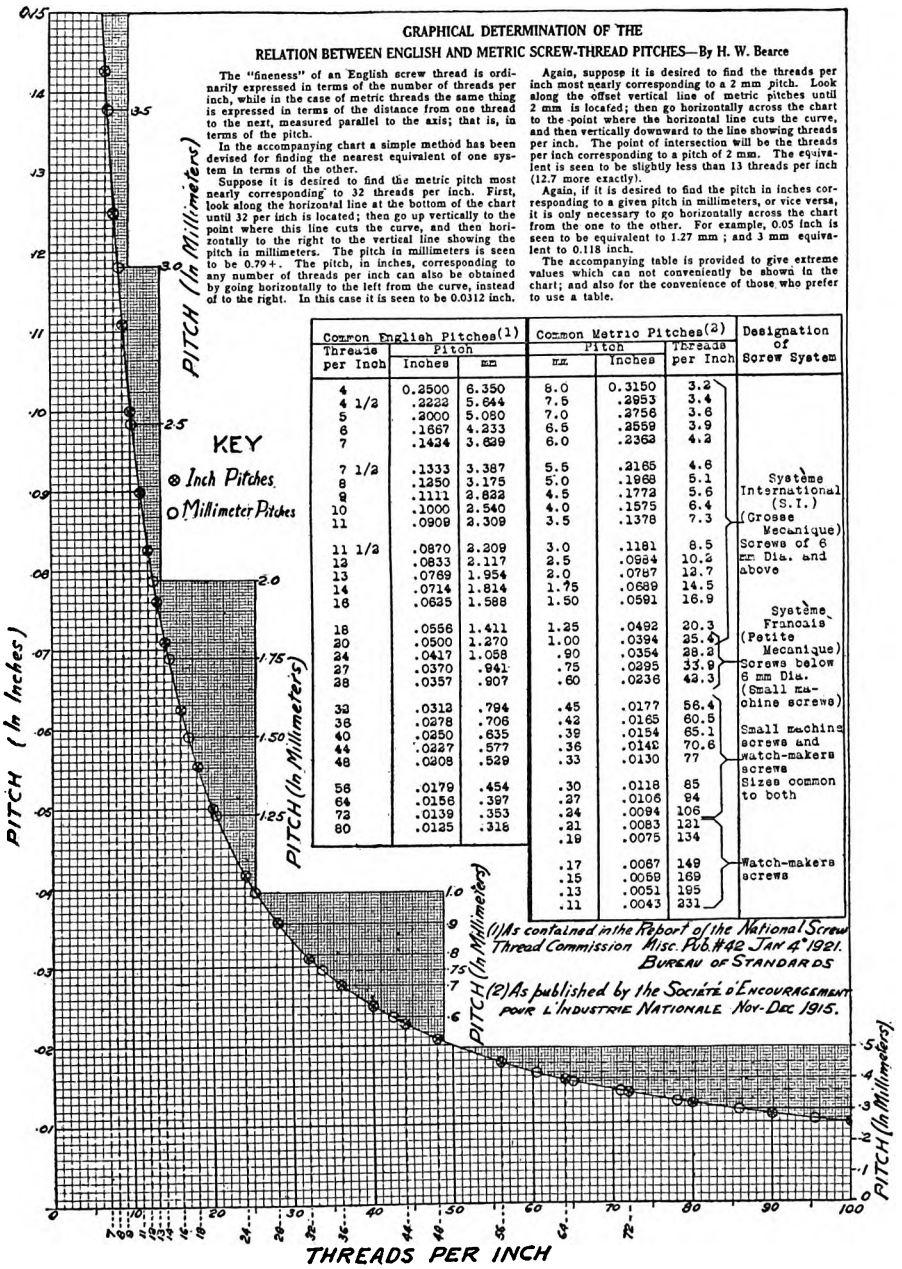
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MACHINERY

Automatic Machines Replace Hand Labor. Describes very intricate and equally interesting machines which have been developed by Bock Bearing Co., Toledo, O., for gaging and sorting the rollers used in Bock bearings. A single machine replaces 10 girls, and does work more rapidly and accurately. Machine is described in some detail. The company has also developed a grinding machine which automatically grinds the spherical head on the rollers, and takes the place of hand-operated radius grinders. Other machines and other phases of the work of producing these bearings are described. *Iron Age,* 4-20-22, 2800 w. MAH.

Examples Where Vertical Milling Saved Money. A number of pieces of work are shown and described, on which the vertical miller has made much better time than any other machine. Some of the others were boring mills, some shapers, some planers, etc. A single example will show: a cast steel electric motor bracket which required 55 mins. to finish on the boring mill was completed in 9½ on the vertical miller. The article goes on to show how work should be handled, how held on the machine, what kind of tools should be used, etc. It takes up continuous milling as well. J. H. Moore, *Can. Machinery,* 4-30-22, 2100 w. MAH.



Graphic Comparison of Screw Thread Pitches.—(U. S. Dept. of Commerce; Bureau of Standards).

Cutting Production Time in Four. Study will adapt almost any piece, no matter how complicated to the automatic screw machine, and once the work has been adapted, the tools made and set up, and a long run started, the cost of production is certain to be materially reduced, that is to ¼ or less of the former cost. Author takes an apparently very complicated small piece, with several stepped surfaces, a deep neck, 3 different internal sizes with shoulders, etc., and shows how this was adapted for automatic screw machine work, and gives also specific figures how the time on this was cut down to its lowest possible limit. Also describes other similar pieces of work in the same way. J. H. Moore, *Can. Machinery,* 3-16-22, 1700 w. MAH.

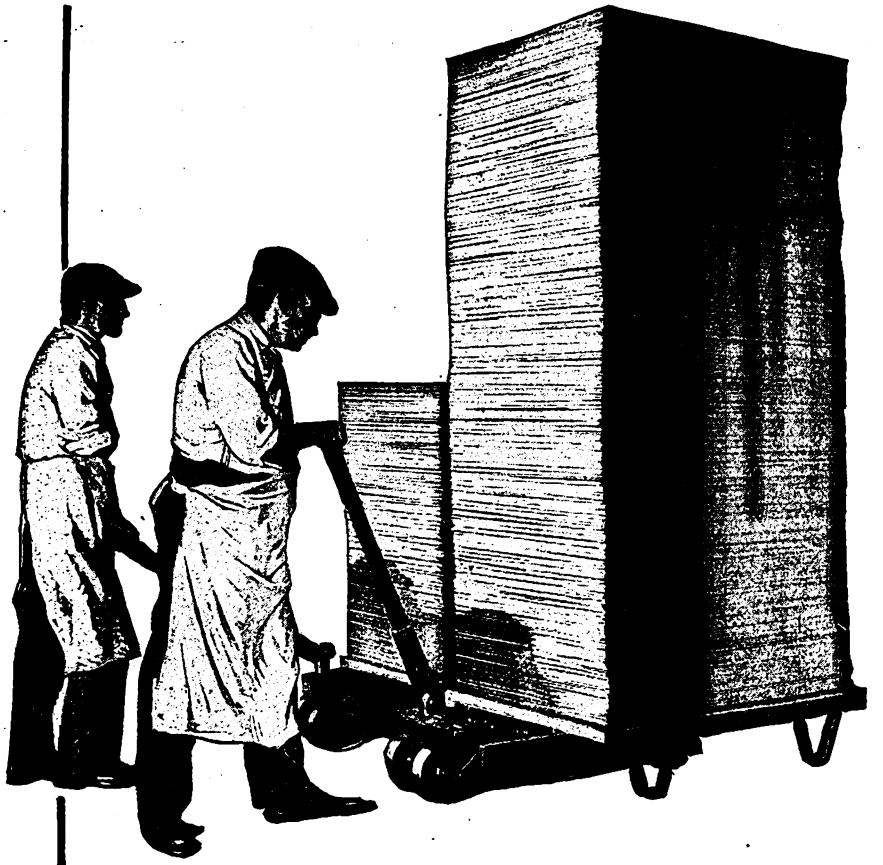
Practical Application of Precision Instruments. A continuation of an article, the first part of which was previously digested here. This part takes up the construction of various kinds and types of accurate gages, the idea being to show how they can be so accurate. Other sub-topics are improved designs increase efficiency, reducing weight of larger sizes, combining blocks for checking dimensions, testing micrometers for wear, checking jigs, snap gages, plug gages, ring gages, others. H. Alton *Can. Machinery,* 4-30-22, 3850 w. MAH.

Handling with Portable Conveyors. The title scarcely does the article justice, for in its scope it far outstrips the simple word "handling." The author describes the present field for all kinds of portable conveyors, and then describes the conveyors themselves, taking up all the well-known products now on the market, and their application to everyday work. In addition, he describes belt roller and similar conveyors, which are more nearly semi-permanent in nature than the ordinary loader or unloader. With the latter, he describes as well the usual sources of power, and some unusual ones as portable gasoline engine power plants. Scattered through the article are many hints firms not now using portables or belt conveyors could take with profit to themselves.E. J. Tournier, *Gas Age-Record,* 3-18-22, 4500 w. MAH.

Driving Chuck for Automatic Lathe. A certain automobile clutch gear was so difficult to handle that none of the ordinary lathe drivers or dogs were suitable. This man designed and constructed a special chuck for this purpose, and the article describes both the clutch gear and the driving chuck, as well as its method of use. E. M. Bidwell, *Machinery,* 4-22, 1300 w. MAH.

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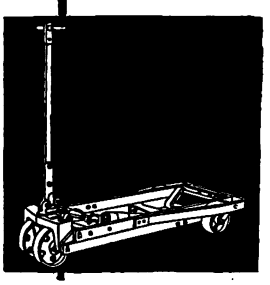


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Pictorial Review Company, of New York City, is another progressive concern which has learned that it pays to buy shop trucks on the basis of what they save, not on what they cost.

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Home-Building Good Furniture Barometer

ALTHOUGH the refusal of the retail dealers to accept inventory losses has been a serious handicap in the recovery of the furniture industry, it is believed that the industry as a whole reached the lowest point of its activity at the beginning of 1921. Since that time it has gained steadily, and a further improvement is expected as a result of the present boom in building operations. The great number of small homes that are now being erected is a favorable indication of increased sales. It is believed that influence from this direction will be felt by the first of August and that it will continue into the early winter. Although the greatest demand will probably be for the medium-priced lines, it is expected that the sales of furniture will exceed those of last summer and fall by at least 50%.

While furniture has resisted the downward movement of prices in general more strongly than any other commodity and has caused buyers to purchase cautiously, it is believed that as prices of other finished materials hold firm, or move a trifle higher, it will be easier to convince the consumer that prices in the furniture industry are stabilized.

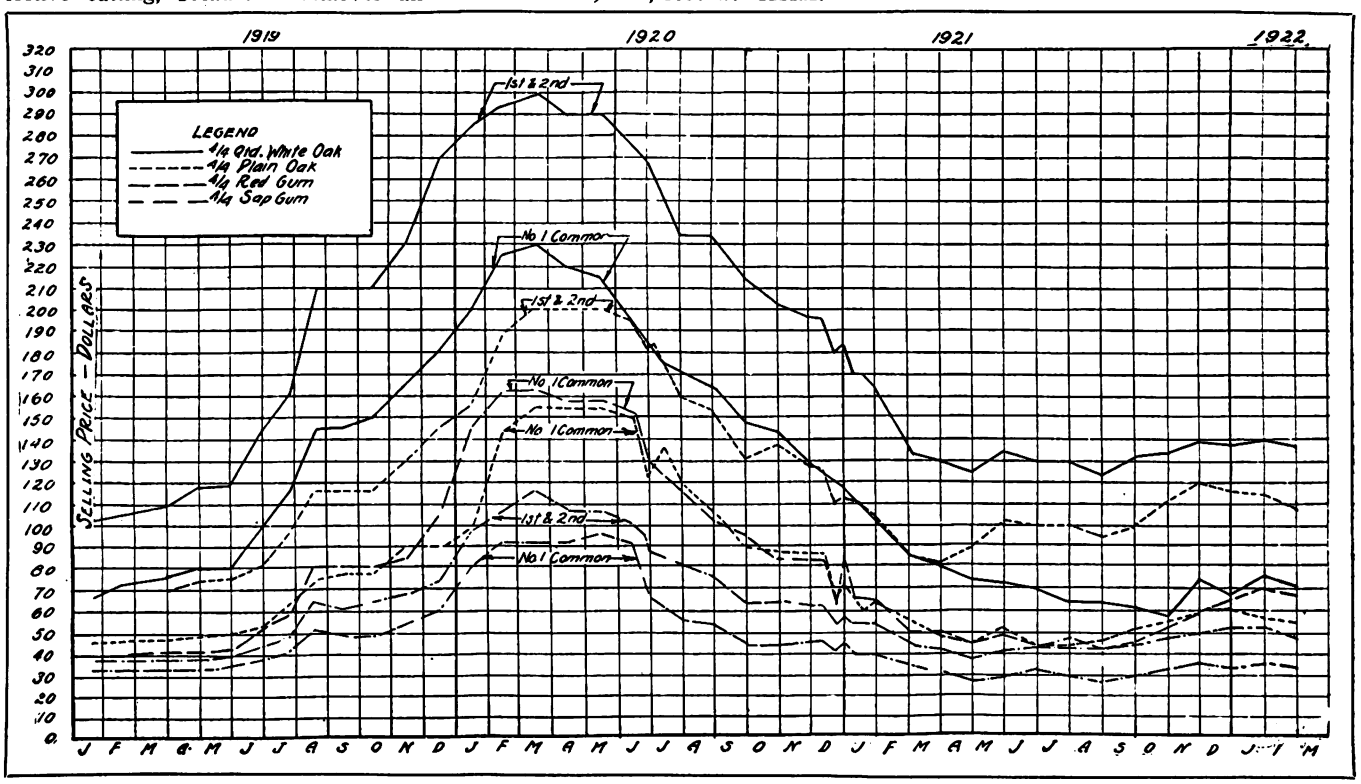
Port Orford Cedar and Selective Logging. Selective method of logging practised in cutting Port Orford cedar concerns community as well as timber and land owners and operators. Co-operation of owners and operators necessary to secure perpetuation of trees, because of varied relations of owners and operators and variety of methods of operating, as shown by following groups: (1) contractors or purchasers cutting Port Orford cedar for special use where only select trees or clear parts of trees are taken. (2) Contractors or purchasers cutting all of the merchantable Port Orford cedar, but leaving all other species. (3) Owners operating on their own land, either for special use or cutting all of the Port Orford cedar. (4) Purchasers of large timber tracts. Clearcutting the stand including all species. (5) Owners of large tracts of land and timber. Clearcuting the stand including all species. Danger to future of Port Orford cedar forest lies in selective cutting, because it removes all cedar from stand and restocking of area depends upon seed in forest floor or in cones at time of cutting. Port Orford primarily a "specialty" wood; if so utilized would become most valuable species in Pacific Northwest. DR. J. V. HOFMANN, *Timberman*, 4-22, 2800 w. HHH.

Use of Pumice. Pumice not a powerful abrasive. Virtue lies in perfection of finish produced, not in amount of abrasion. Among factors contributing to excellence, uniformity and purity take precedence over abrasive efficiency. If two samples of pumice produce same perfection of finish, deciding factor is speed. Abrasive efficiency of pumice may be determined by rapid rotation of metal rod imbedded in mass of powdered pumice. Loss of weight sustained by rod when rotated under known conditions is measure of abrasive efficiency of abrasive in which it is imbedded. LEO RATNER, *Furniture Manufacturer and Artisan*, 4-22, 1000 w. HHH.

Lumber Carload Minimum Weights. Decision handed down in "Lumber Carload Minima" case by Interstate Commerce Commission upholds contention of shippers that cubical capacity basis is unjust. Commission rules that interstate transportation of pine, fir, hemlock, larch and spruce lumber and articles taking Group D rates from points of origin in Oregon, Washington, Idaho and Montana to points of destination, designated in the transcontinental eastbound lumber tariffs, carload minima shall not exceed the following:

	Pounds
For cars 36 feet and under in length	38,000
For cars over 36 feet and not over 42 feet in length	44,000
For cars over 42 feet in length	54,000

When cars are loaded to full visible capacity charges will be based upon actual weight, not less than 30,000 pounds. *Mississippi Valley Lumberman*, 4-22, 1200 w. HHH.



(From Furniture Manufacturer & Artisan)

Hardwood Lumber Price Fluctuations, Quoted on Chicago Market

How America's Leading Men Safeguard Their Health

By Frank G. Soule



FRANK G. SOULE

HOW many times have you picked up your morning paper and read something like this:

"Mr. John Smith, the well-known merchant, was stricken last night in his home with an acute attack of ———. He died before medical aid could reach him. Mr. Smith's sudden and untimely death will come as a profound shock and tragic surprise to the entire community as he *apparently had been in the best of health!*"

Mr. Smith's "sudden" and appalling death got into the papers because of his prominence. But for every Mr. Smith there are thousands of men and women stricken, and snatched away in the prime of life, people whose "sudden" deaths are not of enough importance as "news" to be recorded.

And Mr. Smith *apparently had been in the best of health!* But as a matter of fact his death was not "sudden." Like hundreds of men in your very community are doing today, *he had been dying for years without knowing it.* Had he taken the same precautions with his precious human machine that America's leading men now take with theirs, he might have been spared for many years of healthful, vigorous life.

For it is true that always, for months, even years, there are unmistakable indications in every person's system which shows definitely and conclusively exactly what is wrong. But the pity of it is that the diseases which cause these "sudden" deaths in the prime of life, diseases that often carry off little children, almost in the twinkling of an eye, are so insidious in their attack that there is no outward symptom of their presence until the victim has passed beyond all hope of recovery. In fact, an alarming feature of these diseases is that the very poisons in the blood which cause such "sudden death" often give a fictitious stimulation which gives the victim all the appearance of good health; rosy cheeks, bright eyes and unusual energy. Yet all the time the body may be slowly but surely breaking down under the vicious influence of these unseen poisons.

Because there are 600,000 deaths in the United States each year from preventable diseases—because there are 3,000,000 people sick all the time, most of them needlessly so—because many of these insidious diseases stimulate a fancied feeling of good health and energy—because there are no outward signs which show that the system is slowly getting to the point where "sudden death" is likely: It is for these reasons that America's big men have demanded some kind of efficient protection against the lightning-like death that strikes everywhere, everyday.

Fortunately there is a way to know when this unseen and unfelt disintegration has started, and there are many simple ways of checking the progress of the diseases and restoring the patient to perfect health. Science can warn you of approaching danger, protect you and your loved ones from these diseases and add, perhaps from ten to twenty years to your normal life span.

It is by the use of these scientific measures that America's Leading Men: such men as Wm. Wrigley, Jr., Carl Laemmle, President of the Universal Film Company, George Ade, the Famous Humorist, Chick Evans, the Golfer, Paul A. Harris, the founder of the Rotary idea, Justice O. N. Carter of the Illinois Supreme Court and thousands of other men at the heads of their professions—brokers, lawyers, judges, doctors, preachers, manufacturers, builders, contractors, publishers, editors and writers—protect themselves against, and have ample warning to ward off the slow disintegration caused by sedentary living, lack of exercise and high pressure brain work. These men—every ninety days—without leaving their offices and without spending more than four minutes each year, obtain the most thorough and complete anlysis of their physical condition ever made and receive a detailed report showing exactly what may be wrong. In addition they receive a sheet of helpful suggestions for correcting the trouble and warding off the disease that might otherwise strike death into their midst, deprive their businesses of their guidance, their friends of their association and their loved ones of their protection.

A few years ago, such a service as this—by virtue of its cost and inconvenience—was out of the reach of most men. Only moneyed men could afford to undergo, at the hands of specialists, an examination which showed the exact condition of their bodies. But now, thanks to the corps of trained Scientists and specialists maintained by the National Bureau of Analysis this service has been put within the reach of every man and every woman and made available for every child at a cost which is insignificant when compared with the value of human life.

Send for Free Book on Health

Remember that personal appearance and a feeling of well-being are not always an indication of good health. Instead, the very feeling of good health and energy which you have today may presage a breakdown, possibly a long illness—possibly "sudden" death.



WILLIAM WRIGLEY, JR., *president of the company which bears his name, is one of the hundreds of leading American business and professional men who safeguarded themselves against serious illness and "sudden" death.*

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Copper Is Going Strong

UNUSUAL strength has recently prevailed in the metal markets. Silver, steel billets and lead have reached high marks for 1922, and copper has advanced to a new high level, although not reaching the high price recorded early in January. The copper industry, which was the first to deflate after the war-boom, is recovering very strongly, and the heavy stocks on hand amounting to about 400,000,000 pounds, are about half earmarked for export by the Copper Export Association. Producers are now quoting 13½c and predictions are that the metal will sell at 15c per pound before the end of June, and 16c before September 1. The following table shows the highest and lowest prices quoted for copper over a series of years:

Date	Highest	Lowest	Average
1922	$13.50	$12.00	.....
1921	14.00	12.00	$12.50
1920	20.50	13.75	18.01
1919	24.00	15.25	19.49
1918	26.00	23.00	24.68
1917	36.00	23.50	29.18
1916	35.00	23.00	28.17
1915	23.00	13.00	17.64
1914	15.50	11.30	13.61
1894 (lowest) ..	10.25	9.00	9.43
1880	25.00	17.875	21.50
1875	23.875	21.50	22.69
1870	23.375	19.00	21.19
1864 (highest)...	55.00	39.00	47.00
1860	24.00	19.75	22.875

Losses in Smelting Low-Grade Lead. During war, Continental lead-smelting works were obliged to smelt poor materials like muffle residues, rich slag, mattes and impure low-grade concentrates. Accurate tests showed that charges with 11.41, 12.46 and 15.05 per cent lead gave lead losses of 17.39, 14.64 and 10.9 per cent respectively. Waste gases contained on average 0.732 grams of lead per cubic meter at 35° C., and it was calculated that 6 cubic meters of waste gases escaped per second. Of total loss during 3 weeks, 12. 5per cent went through stack and 87.5 was lost with slag. Clearly evident that in smelting materials poor in lead loss is mainly in slag and that in such operation, given good separation of matte and slag, most important thing is to make slag low in lead. Unavoidable slag losses will always be considerable. C. OFFERHAUS, *Eng. Min. J.-Press*, 4-8-22, 2000 w. CJW.

Blue Powder in Zinc Smelting. Figures of blue powder production show good deal of uniformity and indicate that blue powder product bears large proportion to ore originally charged into retorts; large proportion of retort capacity is devoted to redistillation of blue powder; about 30% of spelter product of furnace is derived from blue powder, *i. e.*, it is zinc that has been distilled twice. European zinc distilling practice is better than American in matter of by-products. Attributable in large measure to European type of furnace front, with condensers enclosed in deep closets and to custom of drawing spelter only once in 24 hours. No criticisms offered. W. R. INGALLS, *Mining Metallurgy*, 4-22, 1500 w. CJW.

Aluminum-Silicon Alloys. Historical review. These alloys in general are quite resistant to corrosion, if iron content is low. They are machinable, but do not machine as well as standard aluminum-copper alloys. Use of processes to modify or disperse silicon is advantageous chiefly when quantities of silicon above 8% are used. Chief advantage of these alloys is in their casting qualities, which advantage is present both in normal and modified alloys. Iron makes aluminum-silicon alloys more corrodable and in general weakens and embrittles them. Greater amount of silicon used, less is permissible iron. It is safe to predict that both normal and modified alloy castings will become commercially important. In modified alloy castings silicon should be from 8 to 15%. In normal sand castings silicon should be from 4 to 10%, according to requirements. ZAY JEFFRIES, *Chem. Met. Eng.*, 4-19-22, 3000 w. CJW.

Cooperite, Non-Ferrous High-Speed Cutting Metal. Nickel base alloy to which are added zirconium, aluminum, silicon, tungsten and molybdenum. Heat seems to increase cutting-edge strength of this alloy, which is best at a dull red visible in daylight. Stands up at temperatures at which high speed steel burns. Cooperite requires no heat treatment. The zirconium with its extremely high melting point is apparently cause of heat resistance. Material is cast and ground and cannot be forged. Photographs show nature of work. *Raw Material*, 4-22, 2000 w. APS.

Automatic Seam-Welding in Making of Tubes. Automatic welding as a commercial process is set down as a combination of temperature, exterior pneumatic force, speed and mechanical pressure. Variation in degree in any one of these is fatal to the success of the operation, and thus, to the plant using it. Author takes up each of these, then all of the available machines, describing the methods of preventing wind, of counteracting strains, of avoiding wave formations. He tells also how to grind the weld, how to conduct the swaging operation successfully and goes into other details. J. L. ANDERSON, *Can. Machinery*, 5-4-22, 3800 w. MAH.

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Arc Welding in Machinery Construction. Large variety of defective or accidentally damaged shop machinery is effectively repaired by arc welding. Examples (with photographs) are given of a large flywheel, a large lathe bed, shafts machined undersize, etc. Coasting vessel (500 tons dead-weight) was built all arc welded without rivets. Small mill building (40x60 feet) was erected by welding process. Ammonia tanks can be successfully arc welded. Description of modern arc-welding generator set. A. M. CANDY, *Engineering World*, 4-22, 2500 w. APS.

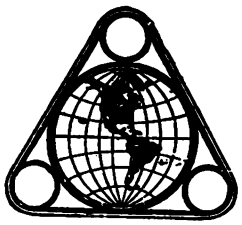
Duralumin: Commercial Possibilities. Review of properties and heat treatment. Use in gears, pinions, connecting rods, etc. Five times as costly as cold-rolled steel, but one-third the quantity is used, thus decreasing the price differential. Saving in labor, etc., so that duralumin structures in certain cases are cheaper than steel. Detailed discussion of thicknesses, forms, etc. Predicts use more universal than steel for structural purposes, in automotive industry, railway and street cars, bridges, boats and buses. Table of physical properties. W. B. STOUT, *Brass World*, D-22, 1200 w. APS.

Lead Burning Today. Lead burning (really lead welding) has developed through increase in storage battery industry and great expansion of chemical industries. Describes joints; butting and lapping. Formerly used hydrogen and compressed air, today use illuminating or natural gas and compressed oxygen. Acetylene and hydrogen also used. H. B. SHONTZ, *Motor Rec.*, 4-22, 1500 w. APS.

A B C of Sheet Metal Working Machinery. Operations and description of hand equipment used in manufacturing tin cans in limited quantities. Output of 100 to 1000 cans per ten-hour day, 2 to 6½ inches diameter, 2 to 9 inches high. L. BROEMEL, *Sheet Metal Worker*, 4-28-22, 9 figs., 1500 w. APS.

Standard Methods of Testing Materials. Report on analysis of aluminum sulfate, basicity or acidity of alum, lime for causticizing, crown filler and specifications from American Writing Paper Co., for crown filler. F. BECKER, *Paper Trade J.*, 4-13-22, 2500 w. CJW.

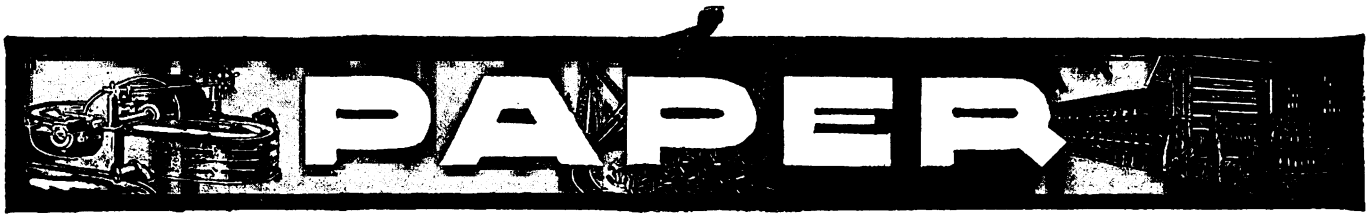
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Paper Manufacturers Seek New Outlet

ACCORDING to the bulletin of the American Paper and Pulp Association, new uses for paper must be found to take up the present large surplus of machine capacity. Before 1914 the industry was operating at about 80% of capacity, but during the war the full capacity was absorbed and during the last three years 120 machines, with an annual capacity of 1,675,000 tons each, have been added, increasing the total capacity 23%.

Although the improved conditions in the industry which were beginning to be evident in April have continued into May, with further increases in orders and generally better prospects for business, it is estimated that under normal conditions the 1922 production would be 6,800,000 tons of 78½% of capacity. It will take until 1925 for the industry to get back to the production of 1914, if only the normal increased consumption of 200,000 tons per year is maintained. It will take until 1928 to get the industry up to 90% of capacity. Since a paper machine can be operated successfully only when running practically to capacity, the finding of new outlets for the product of the machines appears to be the only solution.

Drying of Paper. Considers properties of paper under heat, drying conditions, heat supply and removal of water vapor. Drying conditions must be arranged to satisfy characteristics of paper under heat so that most rapid satisfactory drying rate is maintained. In drying paper 25 per cent of total water removed is by suction, 45 by first press, 3 by second press, 26 by drier, with 1 per cent remaining in felt. More cannot be removed by press rolls because caliper of sheet is reduced too much. In drying first requisite is dry steam entering dryers, which should be as high pressure as possible considering quality factor. Circulation is necessary to efficient operation, since it governs water and gas films inside dryer. Air systems for removal of water vapor must have capacity to carry away water vapor, be able to produce humidity difference betwen water vapor on sheet and humidity of air carrying water and must have velocity past sheet. Types discussed and drying curves given. M. B. LITTLEFIELD, *Paper Trade J.*, 4-13-22, 3000 w. CJW.

Chemistry of Sulfite Process. Method of procedure for study of chemistry of sulfite process has been tested and found to be workable. Methods of analysis have been tested and applied to preliminary study. Application of Sander reaction and reversible sulfur dioxide determination, to control of sulfite cook have been tested and found of value. Information as to character of pulp produced at different stages in sulfite cook has been secured. Importance of content of free sulfurous acid at end of cook has been pointed out. R. N. MILLER and W. H. SWANSON, *Paper Trade J.*, 4-13-22, 4000 w. CJW.

Bleach Liquor. Discussion of adaptation of liquid chlorine to bleaching of those fibers which do not respond to acid bleach or where, because of large amount of chlorine necessary, it would be impractical to carry it in solution in water. Work narrowed to lime base because of cheapness. Calcium hypochlorite thus produced, which is same chemical composition as solutions made from dry bleach, but possesses different physical properties. Economies effected are: saving chlorine usually washed to sewer with sludge, use of material that will not decompose during transportation and storage, producing nearly neutral bleach that is extremely active when in contact with pulp. Plant described. S. W. JACOBS and H. P. WELLS, *Paper Ind.*, 4-22, *Paper Trade J.*, 4-20-22, 3000 w. CJW.

Cotton Linter Pulp. General description of process of manufacture of cotton linter pulp. Linters will give rag content with direct proportion to amount used. Most desirable for permanent records, since they contain 98-99 per cent alpha-cellulose. Linters will fold with best quality of new rag, but pop test falls somewhat short of higher grade new rags, being about equivalent of fancy shirts. Gives somewhat more bulk to paper for same unit of weight. Cheaper than old rags. S. E. SEAMAN, *Paper Trade J.*, 4-13-22, *Paper Mill*, 4-15-22, 2000 w. CJW.

Efficiency of Grinders. Economical advantages to be derived from operation of automatic magazine type grinder when compared with pocket type grinder are: maximum production per hp. consumed, lower labor cost per ton of plup, partial steaming of wood at no additional expense, low cost of maintenance and repairs, use of 4 ft. wood, eliminating at least one sawing operation, cleanliness of grinder room, elimination of considerable labor difficulties, use of wood up to 30-in. diameter and saving of floor area and foundation work. J. J. CASE, *Paper Trade J.*, 4-13-22, *Paper Mill*, 4-15-22, *Paper Industry*, 422, 1800 w. CJW.

Power Plant of Paper Industry. Each pound of paper necessitates from 4 to 6.85 lbs. of steam. Mechanical energy to produce paper from logs as delivered amounts to 0.0437 HP. per lb. of paper. Heat balance can be obtained and further maintained by application of properly designed equipment. Modern practice tends toward use of higher steam temperatures and pressures. Discussion of best equipment. *Paper Mill*, 4-15-22, 2000 w. CJW.

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Beater-Room Hazards. Modern beating engine nearly fool-proof. Minor dangers must be guarded against always. Concrete floors are desirable to avoid slipping on wet floors. Elevated tanks of all varieties must be guarded by railings and platforms with toe boards. Valves should not be weighed down when next beater is being dumped. Pulley-driven lines must be guarded and motor-driven lines must be watched because beater room is wonderful conductor. C. WALKER, *Pulp Paper Mag.*, 4-20-22, 500 w. CJW.

Sulfur and Sulfur Burners. Chemistry of sulfur discussed. Oldest type of burner is flat type. Rotary and vertical more efficient. Description of construction and operation. Plant operation facilitated by liberal supply of sulfur, stored in number of smaller bins rather than one large one to decrease fire risk. Accurate inventory of sulfur should be maintained. H. E. WESTON, *Paper Industry*, 4-22, 1600 w. CJW.

Removal of Odors from Digester Blow in Sulphate Mills. By using a barometric condenser instead of the usual tube or surface condenser, the steam is better condensed and the odoriferous gases are more thoroughly absorbed. In addition the air which is always entrained with a barometric condenser spray oxidizes the ill-smeling sulphides and completely destroys the odor of the exit gases. GUSTAF F. ENDERLEIN, *Paper Mill*, 4-29-22, detail sketch, 1000 w. APS.

Fibre Cans. Fibre can economy well balanced and cumulative. Original purchase price far less than cost of metal, saving in time of labeling, and weighing less, requires less heavy packing cases and reduce freight charges. Flexible, they take shock like pneumatic tire and hold original shape. Make favorable impression on consumer. Article shows styles, sizes, shapes and types of construction. *Fibre Container*, 5-22, 1000 w. CJW.

Manganese Steel in Jordans and Beaters. The toughened heat-treated manganese steel beater roll and jordan fillings are practically indestructible. The performance of these parts makes possible better design of machinery. J. H. HOCK, *Paper Mill*, 5-6-22, 750 w. APS.

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as applied to magazines, means the retention of all issues which may be worth something later on. We submit that *each* copy of the *Industrial Digest* is worth saving because of the more than five hundred digests of important articles which it contains. The Annual Cumulative Index which will be sent without charge to all subscribers will make this valuable data instantly available, *provided* the copies are filed for reference.

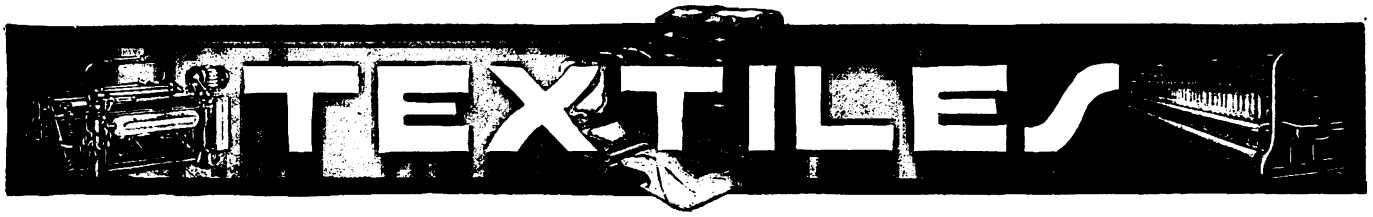
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Book Department

INDUSTRIAL DIGEST

25 West 45th Street **New York City**



Textile Raw Materials Advancing

WITHIN the last few weeks the unexpected rise in the price of textile raw materials has taken place. Cotton, silk, wool, jute and flax have all shown a tendency to advance. According to *Dun's Review* the rise in the price of wool is world-wide, but has become pronounced in this country because of the probable enactment of a tariff imposing a high duty on raw material, to take the place of the emergency tariff now in force. In raw silk and jute crop shortages have been reported. In cotton, the rise in price has been influenced by a number of factors. Chief among these has been Washington's estimates of a larger world's consumption, statistics of the Department of Commerce indicating that the total foi the season ending July 31 would about equal that of the pre-war period. Reports of unfavorable weather in Texas, active Southern buying, strong Liverpool cables, an increasing demand for domestic manufactures, the improved political outlook in Europe, and an optimistic sentiment in local speculative circles, due to the strength of the securities market also contributed to the rise in price.

In every instance, however, the goods markets are reported to have been affected adversely by the low purchasing power of the country, and the increasing competition among retail and wholesale stores. Merchants are doubtful as to whether there will be much change in purchasing conditions, and it is believed that for some time to come the lack of money to buy freely will stiffen public resistance against rising prices.

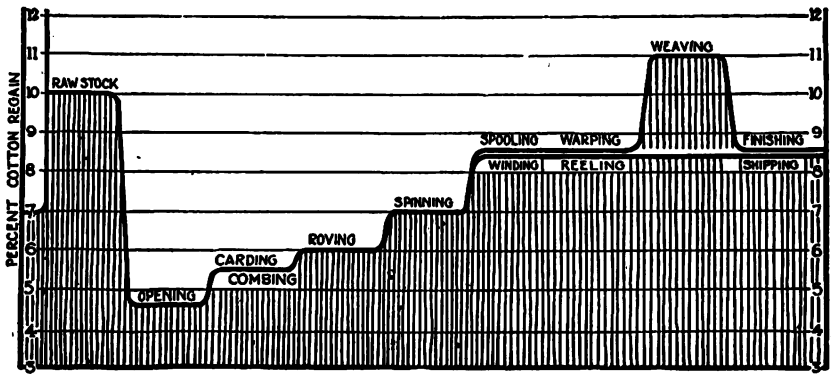
Organic Acids in Treatment of Textile Fabrics. Treatment with acetic acid results in little deterioration. Sulfur dyes not affected; uneven dyeings with basic colors may be avoided. Oxalic acid has little tendering effect, and is useful in many discharge processes and in fixing fabrics mordanted with tannic acid (as potassium antimony oxalate), though tartaric acid may be employed more extensively. Citric acid is useful in discharging iron, aluminum and chrome mordants and is therefore useful in printing madder styles. Formic and lactic acids are also increasing in favor. Lactic acid can be used in chroming of wool and luster and soft handle are not diminished in this treatment. Lactates may be used in place of tartar emetic. Also used in discharge processes and in aniline black printing. A. J. HALL, *Am. Dyestuff Reporter,* 4-24-22, 1500 w. CJW.

Lubrication of Wool. Correct lubrication of wool fibre, though of greatest importance, is usually neglected except in large mills. Oil should be added after wool is dry and clean; before carding and spinning process begun. Cheap oil requires more scouring to remove in finishing process of cloth. Potash soaps less hard on wool fibre, but more expensive than soda soaps, which are generally used. Impossible to use soda and hot water on dyed goods. Oils must have low flash point and not turn rancid quickly. Mineral oil is cheapest, used most frequently, often with dire results. Vegetable oils are much better. Animal or lard oils are popular, as, being animal, they are akin to natural grease of sheep, making the best wool lubricant. B. X. C. BAILY, *Canadian Textile Jour.,* 4-25-22, 800 w. MBB.

Gummed Cloth Sealing and Binding Tapes. Well-known puncture test has proved utterly inadequate to determine strength of cloth tape for binding purposes. Many different types of apparatus for determining tensile strength, but the varying results very disturbing. In designating medium grade, following specifications are recommended as standard; cloth tape to have not less than sixty filling threads to the inch of size not less than No. 38; for heavy grade, not less than forty-eight filling threads to the inch of a size not less than No. 20. C. H. CROWELL, *Canadian Textile Jour.,* 4-25-22, 600 w. MBB.

Acetyl Silk Dyeing. Acetyl silk, mew ester—silk now entering market. Gives methods of dyeing it. J. F. BRIGGS, *Textile Colorist,* 4-22, 2500 w. To be continued. .WRR.

Jute Bleaching and Dyeing. Give properties of jute, preparation, methods of bleaching, dyeing, and how to use various dyes, printing. E. DUHEM, *Textile Colorist,* 4-22, 5000 w. WRR.



A Graphic Analysis of the Best Cotton Regain Conditions.—(Prepared by Parks-Cramer Co., and Published in *Cotton Mill News).*

Causes of Shadedness and Cloudedness. Caused because goods are poorly prepared, uneven steam pressure, steam not allowed to pass through goods evenly, uneven roller pressure on crabbing machine, varying temperature of water, goods rolled up wet to set filled with dirty water, and in dye kettle, goods taking up dye too fast caused by admission of steam too rapidly. Use of too much acid is also factor. Many so-called shady goods due to uneven shearing from shears and uneven pressure in dry finishing. Not altogether dye-house problem, but usually charged to dye-house. F. E. JOHNSON, *Am. Dyestuff Reporter,* 750 w. CJW.

Cost Finding in Knitting Mills. Necessary in order to meet competitors' prices. Conservation of resources; accurate planning; organization: organization analysis. STEPHEN R. GORDON, *Textile World,* 4-15-22, 4500 w. To be continued. WRR.

Woolen and Worsted Cloth Finishing. Covers use of horizontal blowing machines; blowing and its effect on fabrics; defects produced by blowing; boiling and its defects; machinery used for boiling. TEXTUS, *Textile American,* 4-22, 7000 w. To be continued. WRR.

Mixed Cotton and Silk Piece Goods Dyeing. This number upon dyeing and printing aniline black. Four different aniline black effects. Defects and methods of using. RAFFAILE SANSONE, *Textile Colorist,,* 4-22, 1200 w. To be continued. WRR.

Removing Yarn Kinks in Twisting. Illustrated description of simple attachment for twister frames that can be made in any mill carpenter shop. RADIAL, *Textile World,* 4-8-22, 800 w. WRR.

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1,000,000 Carloads of Gravel for Roads

THE remarkable increase in road construction in this country, says *Steam Shovel and Dredge Magazine,* is evidenced by the fact that during the past year more than 1,000,000 men found employment at building and repairing the Nation's thoroughfares. The different classes of roads completed totalled 24,000 miles—almost equal to the earth's circumference.

The 1922 program of the Federal Bureau of Public Roads calls for the construction of approximately 10,000 miles of improved highways, sixteen States having already submitted plans for the building of this mileage. The Government survey shows that there are more than 300,000 miles of improved roadways in the country, and about 2,500,000 miles of roads that might be greatly benefited by even a small amount of work upon them.

The beneficial effect of increased activity in roadway construction upon allied industries is indicated by the fact that 50,000,000 tons of gravel and stone will be required for the Federal highways completed and under construction at the close of 1921. This means 1,000,000 carloads and is equal to the total annual production of all commercial sand and gravel plants in twenty-nine States in the eastern half of our country. Federal roads under construction or completed last year called for 17,000,000 bbls. of cement, or about one-sixth of the largest annual production on record.

Economics of Highway Transport. Topical outline is as follows: Field of highway transport, 3 sections; Highway and motor vehicle, 5 sections; Legal phase, 3 sections; Principles of successful operation, 7 sections; Selling transportation, 5 sections. *Automotive Industries,* 3-16-22, 800 w. WRR.

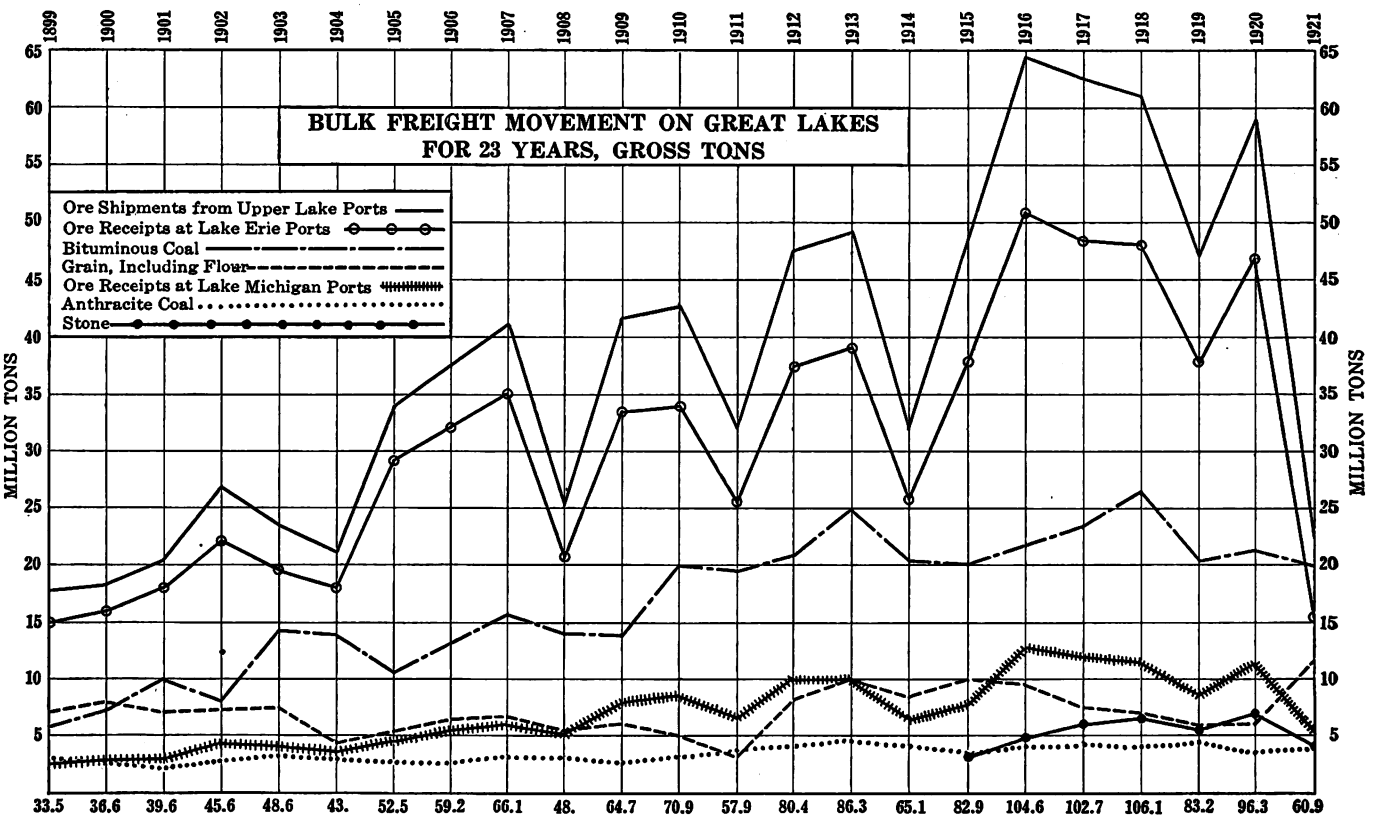
Asphalt Filler for Brick and Block Pavements. Need for stable material indicated by experience. Asphalt will not crack in cold weather, or become soft and flow in hot weather. Methods of applying filler given. CHAS. E. MURPHY, *Highway Engineer and Contractor,* 5-22, 700 w. CS.

Experience Gained from Tests of Railcars. After a general summary of the usual railway tests of new cars and new power units, the author describes recent tests of a new Gramm three-ton railcar chassis. The results are compared with those of a mountain type passenger locomotive as used on the Norfolk & Western. In proportion, the capacity of the railcar being very much smaller, the tests were favorable. DONALD A. HAMPSON. *Automotive Industries,* 4-6-22, 3100 w. MAH.

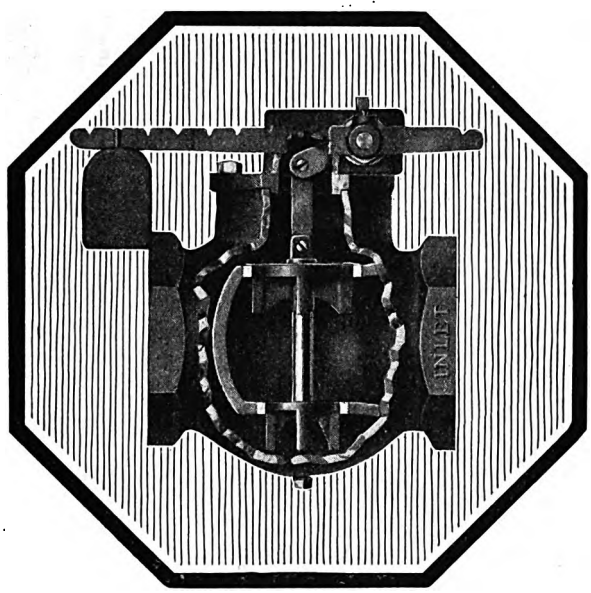
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Double Truck Lightweight Car for Bangor. Description of new Wason-built one-man cars just put into operation by the Bangor Railway & Electric Co. These cars weigh about 28,000 lbs. and seat 52 passengers, as compared with last previous installation of cars, which weighed 46,000 lbs. each and seated but 44 passengers. They have proved efficient in use, coming through the heavy snowstorms of February without any delays or difficulties whatever. Article gives complete details of design, construction and equipment of these more economical cars. HORACE B. BALDWIN. *Electric Traction,* 4-22, 1100 w. MAH.



Figures at the Bottom Show Total Movements of Ore, Grain, Coal and Stone Each Year.—(Chart remade from original by *The Marine Review.*)



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This statement seems to me a fundamental to ensure solid human progress, because it gives the best known enlightenment, next to judgment of men, as to whether solvency reigns or an over-expanded condition of the debtor exists.

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Weathervane

(*From page 1051*)

pressure to reduce wages, while the falling retail prices act to weaken the resistance of the wage earners to moderate reductions. This last effect is, however, partly offset by the continued high prices of rents, light and fuel. The coming summer should, therefore, see the practical completion for the present of the downward readjustment of wages."

Dun's Review makes the prediction that "With the stronger underlying conditions, the current business recovery reflects more positive characteristics of permanency. Progress is still impeded by labor troubles in certain industries, but response to vonstructive factors is more clearly evident in the improved sentiment and revival of buying and the reversal of the price movement has become more decisive. Declines in various markets, continuing for many months have been succeeded by an advancing tendency and demand in different instances is being stimulated by the prospect of higher quotations to follow. Except in retail channels, where price concessions have not infrequently been necessary to maintain distribution, most sellers are now more favorably situated."

Prices Going Up?

(*From page 1063*)

appear to regard rising prices as essential to prosperity. Those who hold that the chief aim of the business man is to 'buy cheap and sell dear' are naturally desirous of maintaining a bull market at all times, though it is obvious that prices cannot rise perpetually. There are times when prices are too low and also times when they are too high. Rising prices produce a happy psychological effect on the business community, and sometimes a tonic of this sort is badly needed.

"There are some occasions when an advance in prices tends to stimulate production and thereby increase employment and enhance the buying power of consumers. Such a price movement is constructive. If business is forging ahead at full speed, however, with practically all industrial plants booked up to their full capacity, a further advance in prices will neither stimulate production nor increase employment. Instead of enhancing the purchasing power of consumers it tends to cripple it, and there soon develops the vicious circle of rising prices, followed by higher wages, which necessitate still higher prices and in turn still higher wages. Such a movement is never constructive; it produces only an inflationist bubble which eventually must burst. The price advances of 1919-1920 were of this character. On the other hand, the recent firmness of prices in some of the basic industries has been accompanied by increased production and more employment. So long as the advance has this effect it is beneficial. The time to take such action is during the period of adjustment. When inflation once gains headway the remedies will be too late."

The Fortnight

(*From page 1053*)

and with him are said to be J. H. Sanford, president of the Carnegie company and William N. Henderson of the Henderson Coal Company. The new company, the name of which has not yet been chosen is to have an annual capacity of 6,000,000 to 8,000,000 tons.

Congress Is Stagnant

CONGRESS is still fumbling around with the tariff bill. All efforts to hasten its passage have apparently failed. The bonus bill, which was reported out of the Finance Committee, will probably not pass until the tariff measure has been put through. The bill will not be effective until January 1, 1923, in any event, so there is no advantage in passing it except for the political effect on the fall elections. All indications now point to a speedy passage of the ship subsidy bill.

Coincident with the rise in prices on practically all commodities there is a steady continuance of wage cuts. This means that the purchasing power of practically all workers is steadily being lowered—with the exception of the farmers. Our farm population is about 35 per cent of the total and consequently when the Department of Agriculture reports that the farmer's purchasing power has increased almost 25 per cent it is a very healthy indication of returning prosperity.

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The INDUSTRIAL CALENDAR

Secretaries of Associations are invited to send us the dates of their conventions as early as possible so that their conventions may be properly listed below. When especially requested by Association Secretaries, we will send dates and other available notices concerning meetings of other associations.

June 11-15. *Associated Advertising Clubs of the World,* Milwaukee, Wis. (P. S. Florea, Secretary, 110 West 40th St., New York.)

June 12-15. *National Association of Retail Credit Men,* Cleveland, O. (W. Reis, Chairman, 15 West 37th Street, New York City.)

June 12-16. *National Fertilizer Association,* White Sulphur Springs, W. Va. (John D. Toll, Secretary, 1010 Arch St., Philadelphia.)

June 12-16. *American Pharmaceutical Mfrs. Assn.,* Bedford Springs, Pa. (R. R. Patch, Secretary, care of E. L. Patch & Co., Boston.)

June 13. *Music Publishers Association of U. S.,* New York City. (E. T. Paull, Secretary, 243 West 42d St., New York City.)

June 13-15. *Illinois and Wisconsin Retail Coal Dealers Association,* Hotel Highland, Delavan Lake, Delavan, Wis.

June 13-16. *Linen Supply Association of America,* Chicago, Ill. (F. H. Hartless, Secretary, 646 North Parkside Ave., Chicago, Ill.)

June 14-16. *International Circulation Managers Association,* Indianapolis, Ind. (C. Eyster, Secretary, "Evening Star," Peoria, Ill.)

June 14-21. *American Railway Association, Mechanical Division,* Atlantic City, N. J. (V. R. Hawthorne, Secretary, 431 South Dearborn St., Chicago, Ill.)

June 18. *American Train Dispatchers' Association,* Chicago, Ill. (C. L. Darling, Secretary, 1310 Mallers Bldg., Chicago, Ill.)

June 19-21. *American Railway Association, Puchases and Stores Division,* Atlantic City, N. J. (J. P. Murphy, New York Central Ry., Collinswood, Ohio.)

June 19-21. *Stoker Mfrs. Assn.,* Groton Pt., Conn. (J. G. Worker, Secretary, Eau Claire, Wis.)

June 19-23. *National Retail Hardware Association,* Hotel Sherman, Chicago, Ill. (Herbert P. Sheets, Secretary, Argos, Ind.)

June 19-24. *National Association of Building Owners and Managers,* Bedford Springs, Pa. (H. G. Loomis, Secretary, Omaha National Bank Bldg., Omaha, Neb.)

June 20-23. *Society for the Promotion of Engineering Education,* University of Pittsburgh; Annual Convention, University of Illinois.

June 20-23. *National District Heating Assn.,* Cedar Point, Ohio. (D. L. Gaskill, Secretary, Greenville, Ohio.)

June 20-23. *Lions International Convention,* Hot Springs, Ark. (Melvin Jones, Secretary, McCormick Bldg., Chicago, Ill.)

June 20-24. *Society of Automotive Engineers,* White Sulphur Springs, W. Va. (C. F. Scott, 29 W. 39th St., New York City.)

June 21-22. *American Society of Civil Engineers,* Annual Convention, Portsmouth, N. H.

June 22-23. *National Hardwood Lumber Association,* Congress Hotel, Chicago.

June 26-27. *National Ornamental Glass Mfrs. Assn.,* Cincinnati, O. (C. C. Jacoby, Secretary, 2700 St. Vincent Ave., St. Louis, Mo.)

June 26-30. *American Institute of Electrical Engineers,* Niagara Falls, Ont. (29 W. 39th St., New York City.)

June 26-July 1. *American Society for Testing Materials,* Chalfonte-Haddon Hall Hotel, Atlantic City, N. J. (C. L. Warwick, Secretary, 1315 Spruce St., Philadelphia.)

June 28-29. *American Association of General Baggage Agents,* Minneapolis, Minn. (E. L. Duncan, 332 South Michigan Ave., Chicago, Ill.)

July 9-12. *International Association, Display Men,* Chicago, Ill. (L. A. Rogers, Secretary, John D. Mabley Co., Detroit, Mich.)

July 10-15. *Export & Import Exposition,* Baltimore, Md. (A. E. MacKinnon, 405 Lexington Ave., New York.)

July 16. *American Institute of Banking,* Portland, Ore. (R. W. Hill, Secretary, 5 Nassau St., New York.)

July 25-28. *National Retail Tea & Coffee Merchants Assn.,* Hotel Statler, Detroit, Mich. (R. M. Heizer, Secretary, 1201 Cornell Ave., Indianapolis, Ind.)

Aug. 23-25. *American Association of Railroad Superintendents,* Kansas City, Mo. (J. Rothschild, 400 Union Station, St. Louis, Mo.)

Aug. 28-Sept. 2. *National Safety Council,* Detroit, Mich. (S. J. Wiliams, Sec., 168 N. Michigan Ave., Chicago, Ill.)

Sept. 11-15. *Association of Iron and Steel Electrical Engineers,* Cleveland. (J. F. Kelly, Secretary, Empire Bldg., Pittsburgh.)

Foreign Events

June to November. *French Colonial Products,* Marseilles, France.

June 15-24. *International Exhibition of Foundry Equipment and Materials,* Birmingham, England.

June 15-Sept. 15. *Annual Exhibition of Ceramics and Glassware,* Dresden, Germany.

July. *Second Near East Sample Fair.* New exposition buildings being erected along the Danube.

July 1-24. *Aircraft Exhibition,* London, England.

July 9. *Universal Exhibition,* Buenos Aires, Argentina.

July 24-29. *International Tobacco Trade Exhibition and Conference,* London, England.

Aug. *Second Sample Fair,* Lublyana (Leibach), Yugoslavia.

Aug. 12-20. *Third Annual Sample Fair,* Liberee (Reichenberg), Czechoslovakia.

Aug. 27-Sept. 2. *Autumn Fair,* Leipzig, Germany.

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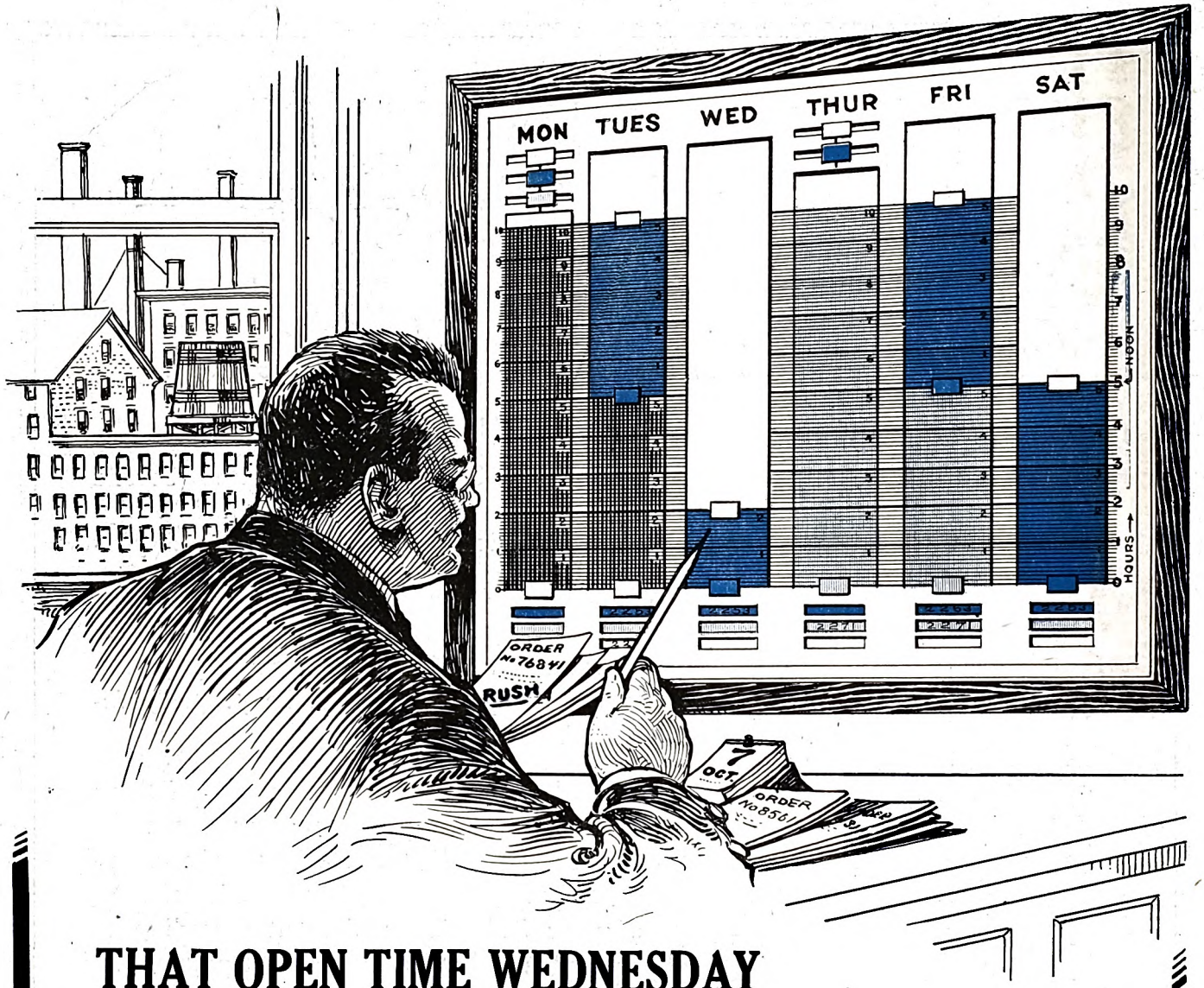
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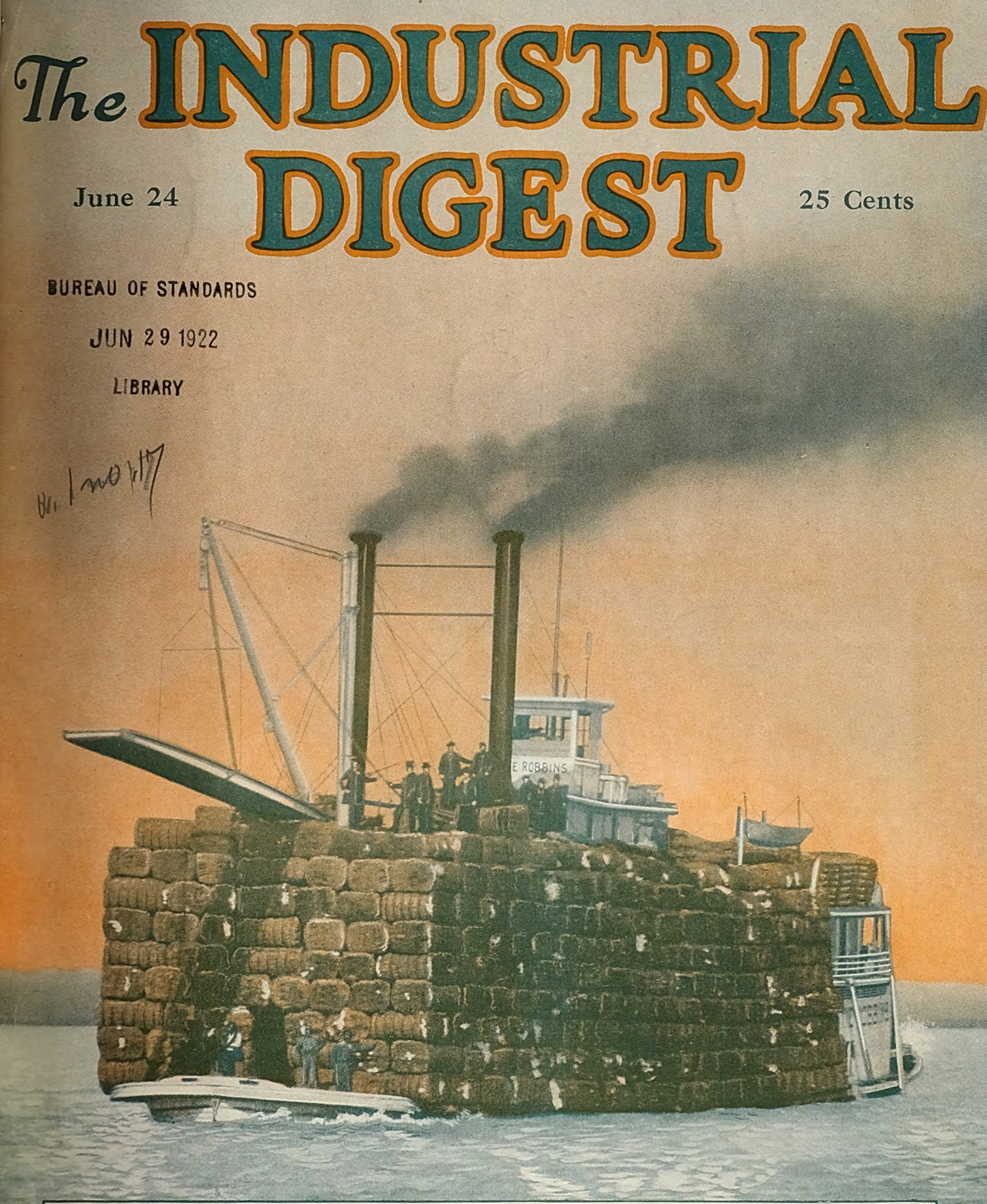
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The INDUSTRIAL DIGEST

June 24

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Industrial Management.

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Can your decisions and policies in meeting present conditions, then, be other than fettered by such habits—these "ghosts of yesterday"?

The solution lies not in revolution, but in evolution; through a fresh point of view and the application of sound economic principles.

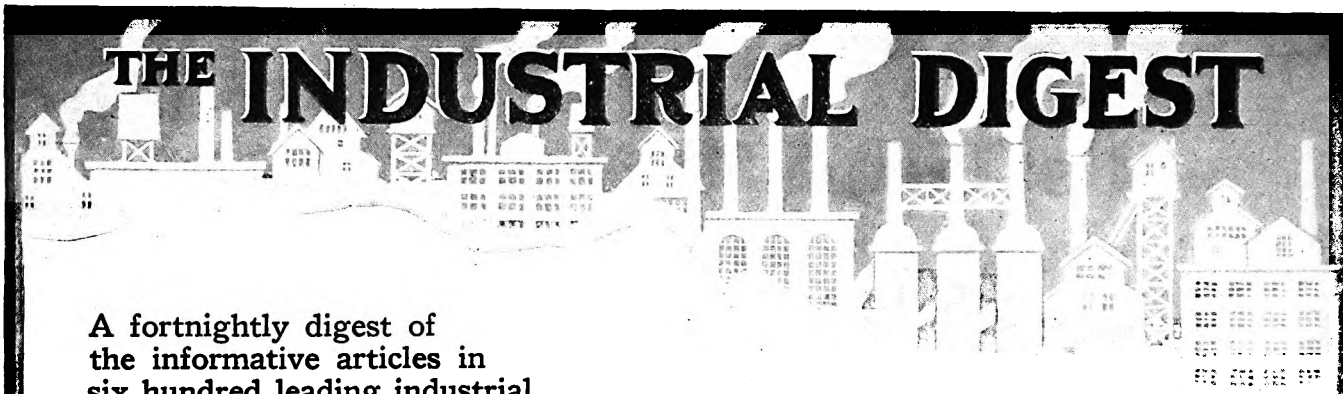
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Industrial, Organization, Cost and Sales Engineers



THE INDUSTRIAL DIGEST

A fortnightly digest of the informative articles in six hundred leading industrial magazines covering thirty industries

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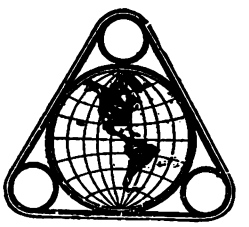
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The
J. G. White Management Corporation



INVESTIGATIONS AND REPORTS ON THE UNDERLYING CONDITIONS AFFECTING PROFITS AND INVESTMENTS

MANAGERS OF MANUFACTURING PLANTS AND BUSINESS ENTERPRISES

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N E W Y O R K

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"Where can I effect the greatest saving in my manufacturing costs?" is a question we are often asked. The specific conditions existing in the plant in question determine the answer, of course, but in a surprisingly large number of cases the answer is found by our staff of engineers and expert accountants to be—"By utilizing the full capacity of your equipment every working hour."

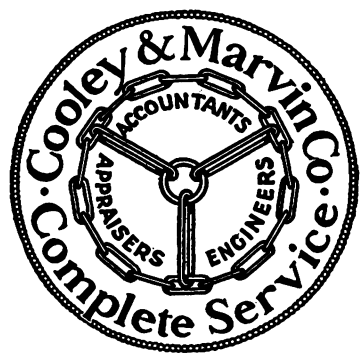
Manufacturing plants seeking to increase their output are sometimes found to be underequipped—but more often they are *underoperated.*

If your plant is underoperated—if machines and equipment (and even men) are not being utilized to their greatest advantage *every* working hour—that is **your** business. If you are interested in finding out just *where* the waste occurs and in learning exactly *how* to eliminate your trouble that is **our** business.

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Vol. 1
No. 17

THE INDUSTRIAL DIGEST

June 24
1922

The Business Weathervane

A Summary of Expert Opinion

In the opinion of the **Brookmire Economic Service,** "the usual summer let-up in business is beginning to appear and should be expected, but this year is quite the opposite from last year, as we were then in widespread depression from which we did not begin to emerge until late summer. Now we have had ten months start on the road to prosperity with the outlook measurably brighter for fall trade than a year ago. The next two months will be in the nature of a breathing space during which further strength will be gathered for a greater effort and more decided advance."

The **United Business Service** points out that "the continual ebbing of the tide of failures is significant for the determination of credit extensions, and for some time to come a diminishing degree of hazard will be experienced by credit grantors. The total number of failures as well as total liabilities for the month of May were the smallest since last October.

"The present period of the business cycle, with a gradually declining rate of business mortality, is a far less hazardous time to extend credit than during an inflationary period when the natural inclination is to do otherwise. We believe, therefore, that these facts justify further emphasis at this time of a policy of greater leniency in credit extensions."

According to the **Graphic Investment Service,** "Mail-order sales are now improving. They continued to fall off throughout almost the whole of 1921, and it is only since February that a marked recovery has set in. Since they reflect with considerable accuracy the buying powes of the farmer, this belated improvement is very welcome. Commodity prices in general have risen 12% during the past year. That would have been esteemed a considerable advance in pre-war times, and it has a decided effect in encouraging merchants and business men to take on their ordinary stocks of goods."

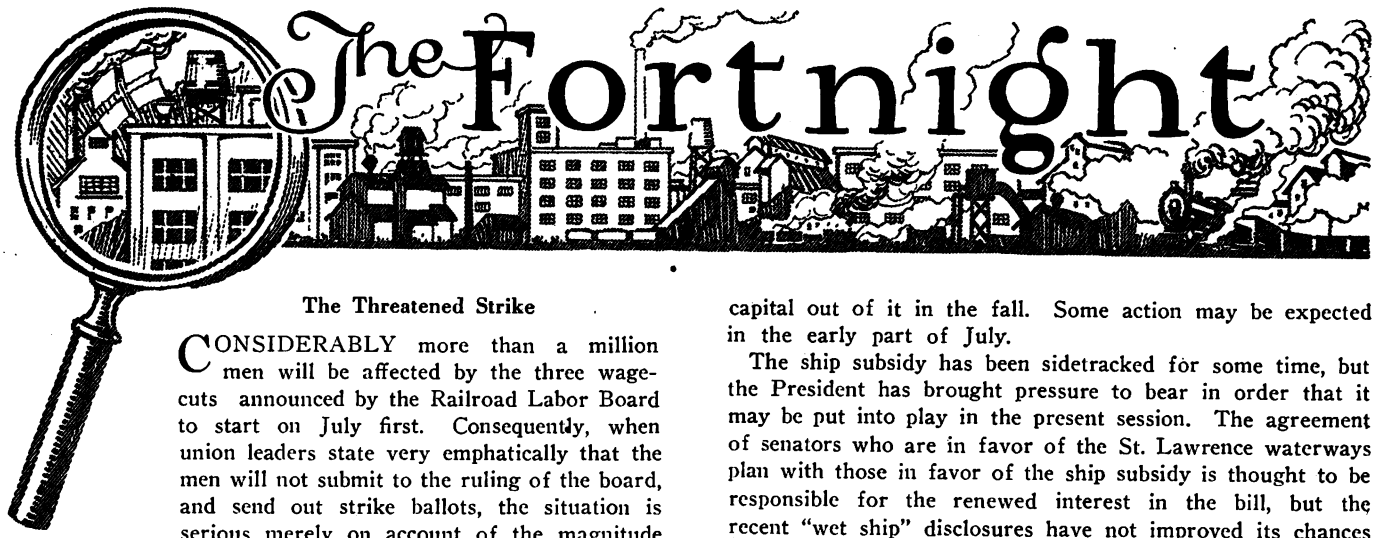
B. C. Forbes believes that "Nothing—not even a crop failure—would more surely decree the killing of the healthy recovery now under way than shortsighted boosting of prices. The public is beginning to spend money with almost normal freedom, except that prices are still closely scrutinized and a good deal of "shopping" is indulged in, especially by women, before purchases are actually made. As employment increases, and as our enormous agricultural population begins to receive money for the 1922 crops, the total purchasing power of consumers will increase. Just how much purchasing will increase will depend more than anything else upon how prices strike potential buyers. The public has not forgotten how prices were inflated during the war and how effectively they stopped the whole business by simply refusing to buy. It would be in the last degree unwise for the business world to do anything calculated to instigate any recurrence of such resentment and such a 'strike.'"



Wife—"Don't forget, I'm here, dearie."

Dun's Review points out that "Despite new elements of uncertainty in the labor situation and continued strikes in some industries, the business recovery is being extended. Abatement of demand in certain quarters has followed recent large purchasing, but indicates no diminution of confidence, and the large excess of advances in Dun's list of wholesale quotations demonstrates that the upward price trend is gathering momentum."





The Threatened Strike

CONSIDERABLY more than a million men will be affected by the three wage-cuts announced by the Railroad Labor Board to start on July first. Consequently, when union leaders state very emphatically that the men will not submit to the ruling of the board, and send out strike ballots, the situation is serious merely on account of the magnitude of the affair. The ballots have been mailed, and the vote is being taken with every indication pointing to approval of a nation-wide strike tying up practically all rail transportation. Unless level-headed leaders can hold the more radical element in check, the country may be treated to another tieup. Few responsible men on either side of the controversy seem to feel that the matter will come to a head, and experienced observers agree that if the strike is called it will be more in the nature of a demonstration to save the union's face than a serious attempt at avoiding the reduction. The demonstration may take the shape of a strategic withdrawal of enough "key" men to cripple the roads. The rail unions are endeavoring to make the most of the matter, however, and there has been much talk of tying up the proposed rail strike with the coal miners who are already out, linking some 680,000 bituminous coal strikers with the railroad groups in their effort to hold on to gains made during the war. It does not seem likely that so heavy a blow at union labor will find the unions unprepared to take some sort of action, but, on the other hand, labor has learned a lesson from the last year's crop of strike failures, and will probably heed the warning of its conservative leaders before plunging into a long-drawn-out battle. The Labor Board is preparing a statement answering the union's threat to strike.



(Indianapolis News)

Badly Bumped.

Congress Still Procrastinates

THEN too, a strike would be the signal for action by the Administration, especially with the fall elections just around the corner. The fact that Congressmen are fretting in Washington, and are anxious to get home and repair their political fences is sure to have its influence on other matters of importance before Congress. It has been thought by many editors that the tariff would not go through at this session, but others point out that the Democrats are planning to let the bill pass for the express purpose of making political capital out of it in the fall. Some action may be expected in the early part of July.

The ship subsidy has been sidetracked for some time, but the President has brought pressure to bear in order that it may be put into play in the present session. The agreement of senators who are in favor of the St. Lawrence waterways plan with those in favor of the ship subsidy is thought to be responsible for the renewed interest in the bill, but the recent "wet ship" disclosures have not improved its chances any. The bonus measure is still dormant. It is not certain that the bonus will be passed at the present session, since many Congressmen believe that they can put the blame for failure to pass the bill up to the delay on the more important tariff legislation. The farm bloc, or rather what remains of the old farm bloc, are understood to be urging the passage of two measures: an agricultural credits bill, which it is agreed is badly needed, and the Ford offer for Muscle Shoals. None of these measures is apt to go through until the tariff has been completed.

Mexican Recognition Near

THE signing of a financial agreement in New York on the Mexican debt, between representatives of the Mexican Government and the group of bankers headed by Thomas W. Lamont means that recognition of President Obregon's government is near. If the United States recognizes Obregon, France and England are certain to follow. President Hard- has denied that there was anything new in the Mexican situation, but business opinion seems to agree that recognition is imminent. This will, of course, have an influence on those industrial concerns with Mexican holdings.

Coal Crisis Coming

THE crisis in the coal strike is expected to come after the first of July, when the retailers get back into the market under the influence of the reduced freight schedules. Then, too, the reserve stocks of soft coal at manufacturing plants are running low, and within another month some definite action may be expected. The Hoover agreement with retailers is expected to hold prices down to a reasonable limit until the strike has been definitely settled.

Car Shortage Coming

SINCE coal reserves are being steadily used up, when the strike comes to an end coal shipments will be abnormally large. This will cause an extra demand for freight

in Perspective

cars at a time when the crop movement is under way and all available cars are used for wheat and corn. Furthermore, the lowered freight rates are certain to cause a steadily increasing volume of traffic, especially since an industrial revival of no small proportions is looked for in the fall. These facts all point to one conclusion—a serious shortage of cars next fall. The fact that new rolling stock is being rushed to completion does not alter the situation for a sufficient supply of new freight cars could not possibly be obtained in time to prevent the shortage.

Then, too, many cars not now in use, but in the railroad shops for repairs, may be kept out of use if a rail strike should follow, and this would have the effect of accentuating the difficulty.

The European Tangle

THE Genoa conference and the recent meeting of international bankers at Paris have not accomplished a great deal toward the rehabilitation of Europe, except to emphasize the seriousness of the economic situation there. The failure of the bankers to agree on a plan for a loan to Germany may be laid to the door of those French politicians who would willingly cut off Europe's nose to spite its face. It is possible that the Hague convention may accomplish something more, although it seems to be confusing politics with economics as badly as the Genoa conference.

Russian Reconstruction

THE problems in Europe are essentially economic and the intrusion of political principles to the exclusion of all others cannot but be disastrous. The question of international credits is at present treated in the light of political preference, and so long as this view of the matter is taken, little real improvement can be expected. The Russian problem is apparently as far from solution as ever, although practically all economists agree that the return of Russia into the markets of the world is one of the most necessary elements to European reconstruction.

The Summer Lull

BUSINESS all over the country is showing the usual summertime decline, and no improvement is expected until fall. If the coal strike is settled before then, and if the rail strike fails to materialize, industry will be well on its feet again by October. The passage of the Tariff bill will go far toward stimulating commercial activity, and it seems probable that another month will see it well on the road to completion.



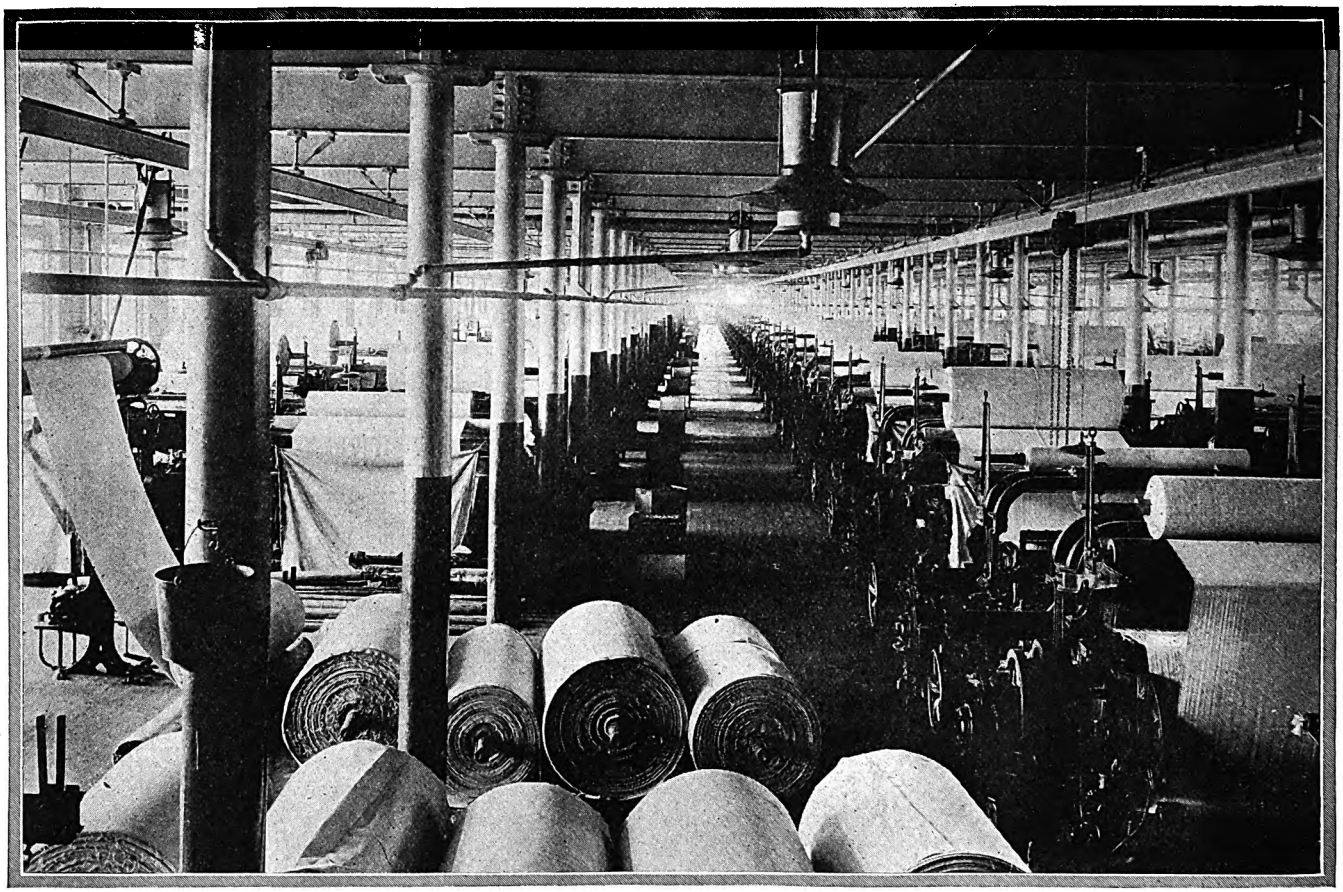
(St. Louis Globe-Democrat)

A high wall and a small gate to keep out foreign competition.



(Brooklyn Daily Eagle)

We really don't need any more rain.



New England's Cotton Mills Fighting for Their Existence

The five months' strike of 50,000 employees in the New England mills is a symptom of economic affliction which results from the commercial advantages enjoyed by newer mills in the South

FIFTY THOUSAND cotton-mill operatives have been idle, and the industry in New England has been disorganized for nearly five months as the result of a strike that is more than a mere struggle between capital and labor. This conflict, which has stopped 10% of the cotton spindles in New England and caused a loss of production of more than 215,000,000 yards of cloth, is a symptom of a profound change in the conditions governing textile manufacturing. It is not simply a local dispute over wages; it is an indication that one of America's greatest industries is changing its location to a more favorable section.

The strike is a result of the competition between the cotton mills of the North and of the South. Manufacturers in certain parts of New England declare that they cannot meet Southern competition without cutting wages, and they therefore announced the 20% reduction that caused the strike.

Since the 1880's the cotton industry of the South has been growing steadily. The invention of apparatus to humidify the air artificially in the mills so that cotton could be kept in the proper condition during the processes of manufacture, caused the industry in this section to advance with tremendous rapidity. Under the stimulus of war conditions it reached the point where it was consuming 55% of the cotton used in the United States.

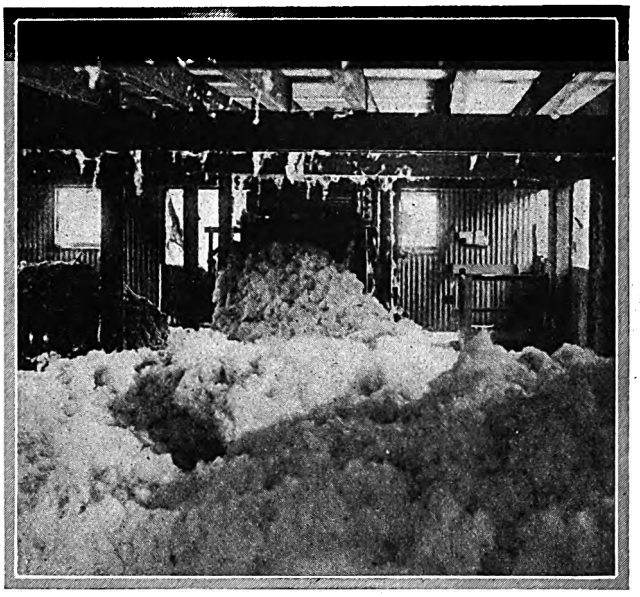
While the demand for cotton was kept up by the war and by the post-war boom the competition between New England and the South was not deadly.

COTTON manufacturing was formerly confined to localities where naturally moist atmospheric conditions permitted weaving and spinning. So our cotton mills sprang up in New England just as England's industry centered in Lancashire. But with the development of apparatus for artificially moistening or conditioning the air in the mill, new plants were built near the raw material source without regard to weather conditions. A row of one type of these small but important "weather manufacturers" can be seen just above the aisle in the weave-shed photograph at the top of this page. New England mills are struggling to maintain their supremacy by clinging to the manufacture of the finer grades of cloth, leaving the cheaper lines to their Southern competitors.

There was a market for all the goods that both sections could produce.

When the slump came in 1920 the textile industry began to realize its position. Prices dropped perpendicularly, and the mills began to shut down. Then wage cuts were made. The New England mills successfully put into effect a 22½% general reduction in December, 1920. Labor disturbances and wage reductions occurred in the South also.

At the close of 1921 wages in both North and South, according to the best available estimates, remained about 100% above those which had been paid before the war. The Southern industry felt that the readjustment was fairly complete and that development could continue without further cuts. The New England manufacturers, however, were not satisfied. Hence, the attempts at wage reduction in the Pawtucket district of Rhode Island, later in New Hampshire and still later in Massachusetts, resulting in the present strike.



Not a snow factory, but a huge cotton-gin removing the seeds from the fibre. ***(© International.)***

The story of the development of the cotton manufacturing industry in the South, and the advantages enjoyed over the Northern competitors, was told by George S. Harris, president of the Exposition Cotton Mills, Atlanta, in an address before the spring meeting of the Society of Mechanical Engineers:

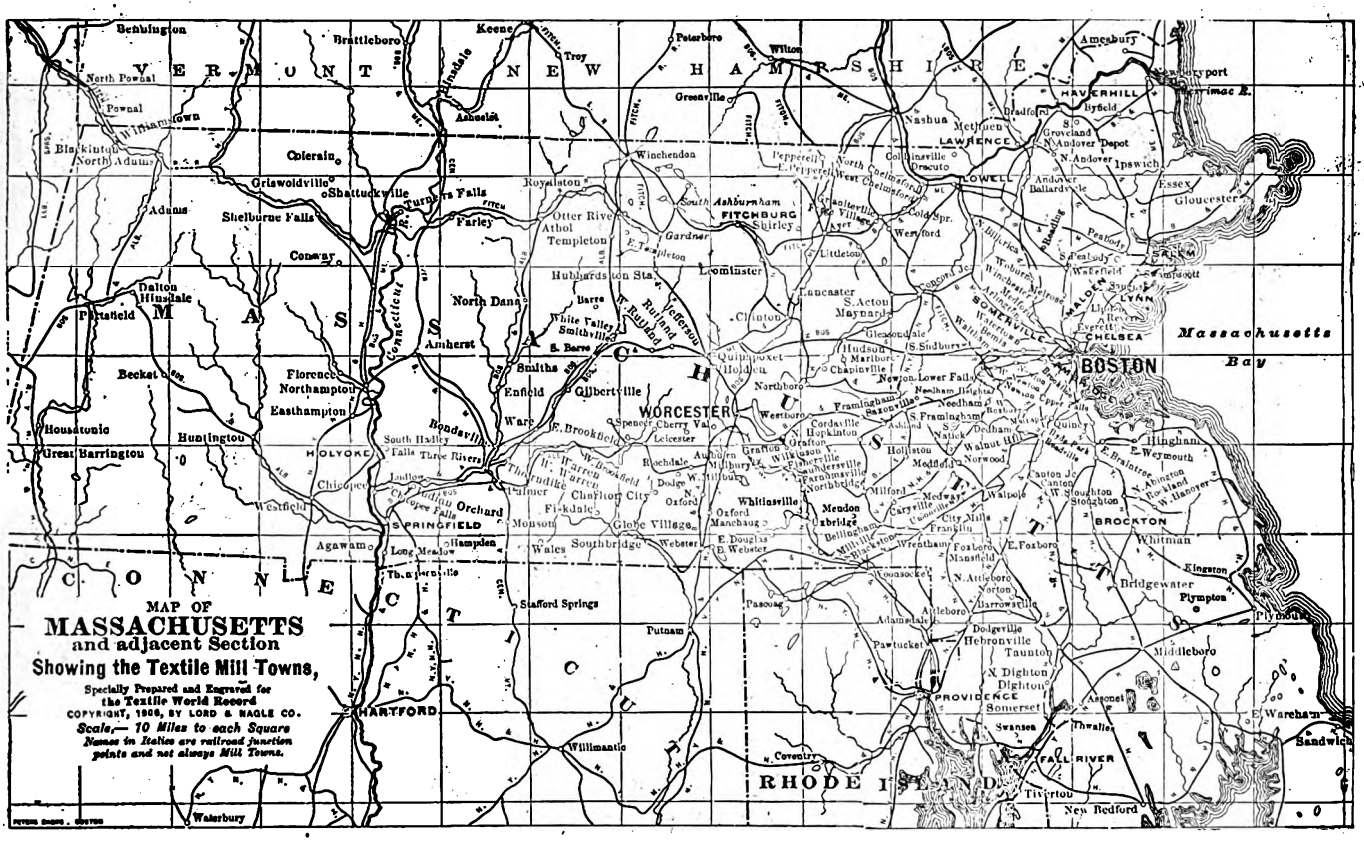
"For a term of years our development was phenomenal," said Mr. Harris, "until today the cotton-growing States are making into yarn or cloth considerable more than half the cotton manufactured in this country. Of the 37,000,000 spindles in the United States, the cotton-growing States have 16,000,000, or more than 43%. The mills of the cotton States are now consuming 55% of the cotton consumed in the country, with a steady increase.

"Before the successful development of the humidifying apparatus, cotton mills were confined to certain localities in which could be found natural atmospheric conditions permitting weaving and spinning. This very largely accounts for the large number of cotton mills in England and later those in our New England States. In the Southern States the hot, dry summer so necessary to the growth of cotton did not encourage the spinner, and the few mills we had in the old days were located on the banks of rivers for the dual purpose of supplying power and natural humidity. Some mills were scattered over the South, but the real growth was in New England."

Then came the development of apparatus for artificially keeping air in the mill at the correct degree of humidity and temperature. Mills no longer needed to be built to suit weather conditions. The South was the logical center for new mills.

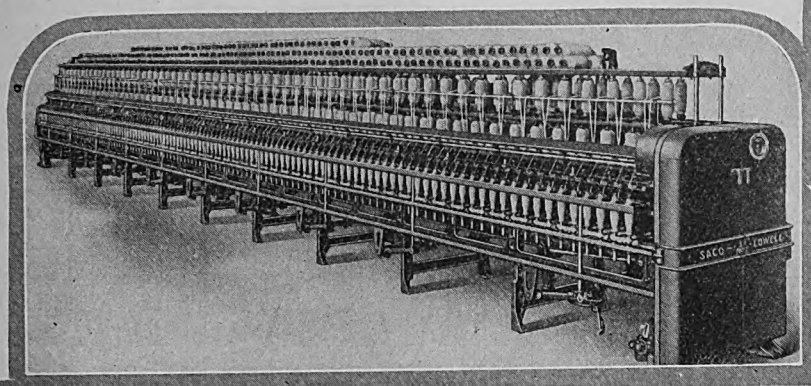
"It might well be asked why the Southern mills advanced so much more rapidly than those in any other section, and I will attempt to answer, in part at least. We will take for comparison a mill in Georgia and another in Lowell, Mass., without any intention of discrediting what has been achieved by our friends of New England. As a matter of fact, we of the South marvel at their ability to show such financial results under their conditions.

"First, in the matter of cotton the Georgia mill has the advantage. When the mill in Lowell requires cotton it first deals with a local broker who will probably place the order

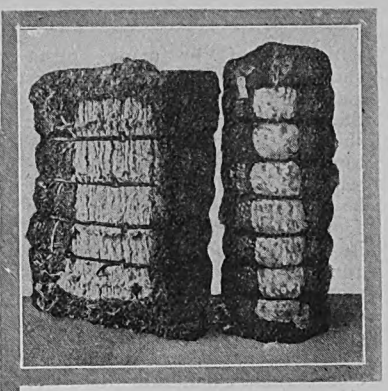


The textile area of New England, showing the present strike district.

Plantation to the Finished Cloth



The ring-spinning frame (shown at the right) performs the same duties as the French process "mule" on the previous page, but does it quicker. Advocates of the "mule" claim that thread spun on the older "mule" is finer and stronger.

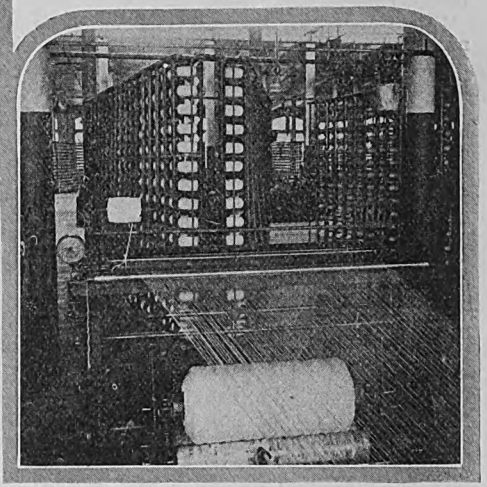


Cotton compressed into bales for shipment. Perhaps the best-known symbol of American industrial life is the cotton bale, which goes by the millions annually to all corners of the globe.

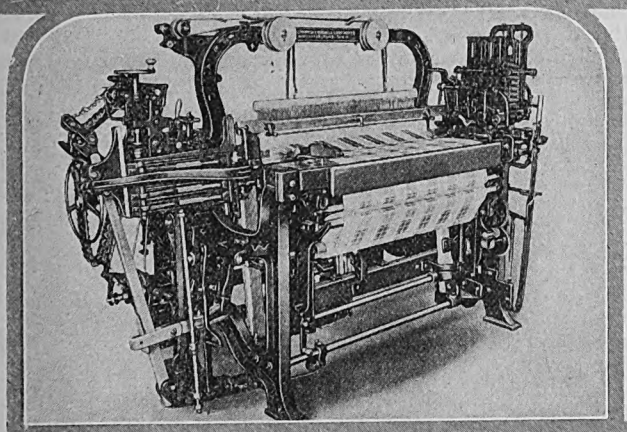


A "close-up" of a roomful of ring-spinning frames in action (at left).

Below, is the ingenious warping machine which winds hundreds of warps simultaneously with fine cotton strands, all ready for the loom.

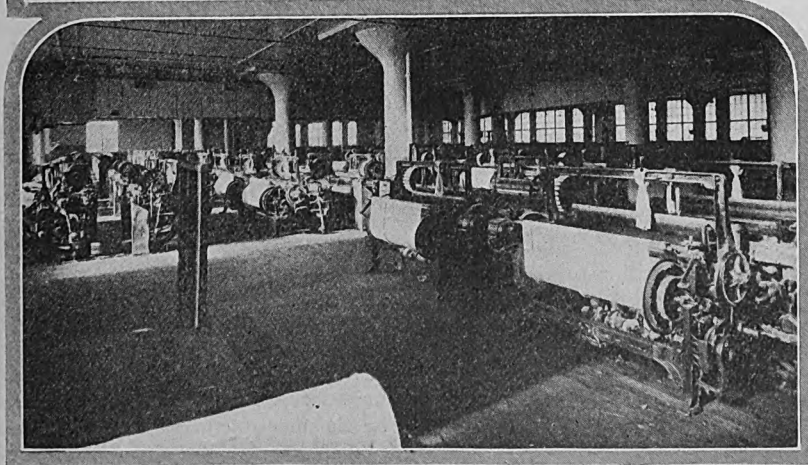


At the right is a type of automatic loom—perhaps the busiest piece of machinery in America. The old intricate looms with their complicated and clumsy parts have given way to these new high-speed automatic looms—and they produce better towels and finer ginghams than the old machinery.



After the automatic loom has its inning, the finished cloth must be inspected. There is small resemblance between the material seen in the corner below and the blossom in the upper corner of the left page, but the process has been completed; and the next step is an order to the tailor.

Another type of automatic loom. Automatic feed and control are in use on these machines. The electrical control will detect imperfections, such as the breaking of a thread, and will stop the machine. Notice the ducts in the background for keeping the air so that the weaving may be done under the most favorable conditions.





with one of the many cotton shippers maintaining a large organization covering more or less the entire cotton belt. These shippers in turn will buy the cotton from smaller shippers operating in one locality who might buy direct from the producer or from a merchant who has taken in cotton on account of supplies furnished during the growing season. The cotton, before it can start on its journey, is concentrated at some point for compression. Here it receives considerable handling and is compressed to a high density. By the time it reaches New England it not only has accumulated a very high freight charge, but the percentage of tare has been increased at the compress.

"In contrast to this long process with its three to four necessary profits, the Georgia mill will buy generally from the local shipper and might buy directly from the large responsible producer, with transportation cost usually only a few points. In addition to this, the mill in Georgia can handle uncompressed cotton, saving the extra tare and expense incident to compressing, besides the extra mill expense in opening compressed cotton. I have never been in a position to make a dollar-and-cents comparison of this cost of cotton, which would naturally vary with the seasons, but the difference must always be there and in some seasons it must be considerable.

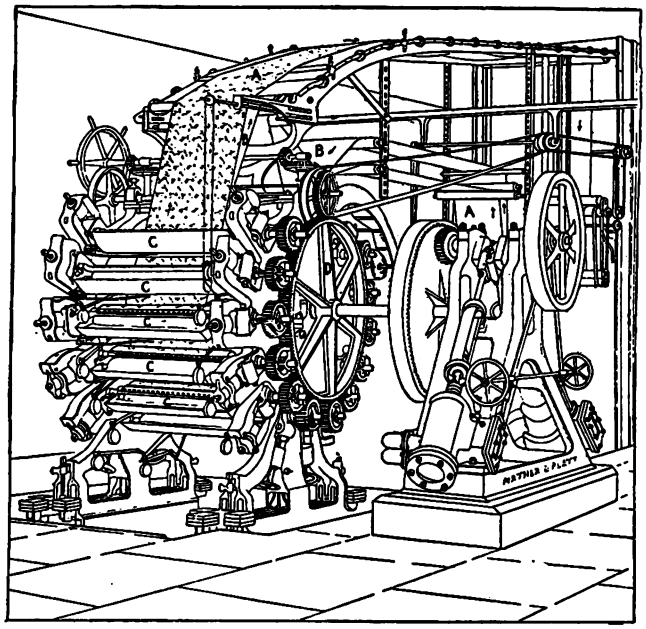


Diagram of cloth printing machine—(a-b) cloth, (c) engraved rollers, (d) main cylinder.

"The labor cost has always been in favor of the Georgia mill, due as much as anything else to climatic conditions. The long, hard winters of the North necessarily make the cost of living very materially higher, which must be borne finally by the manufacturer in his payrolls. In the South from the beginning the mills found it necessary to provide homes for the operatives as this proved to be a decided economic advantage, both to the mill as well as to the operative. The village plans today are given the same consideration as the mill plans in the original layout. This has given the operative a far more comfortable home at a much less cost to the mill than if supplied by outsiders who haven't the same interest in the operatives or the mill. Furthermore, this scheme of things has tended to keep the relationship between employer and employee closer. Contrast this with the operative in New England who lives in a house probably one or more miles from his work and which he rents from a landlord who has no interest in him beyond that of keeping his property occupied profitably.

"There was a time when this was very largely offset by the higher efficiency of the labor in Massachusetts, but this advantage has now been shifted about. With every year our labor has been growing more and more efficient, while the original superior labor of Massachusetts has been replaced each year at a steadily increasing percentage with untrained immigrants.

"In contrast to this, in a Georgia mill is a class of labor, all American, recruited from the farming class. The manager has grown up with them and knows them in their homes. In many cases the mill, being a comparatively young institution, was built from a small unit by the present owners. The manager, living in close touch with the labor, is in a position to talk freely with them. I know of instances in Georgia, during the recent depression, where values depreciated so fast that it was impossible for a mill to continue operating without tremendous losses, but the employees quickly sensed the entire situation and voluntarily submitted to reductions in their pay in order that the mill might continue to operate. Do you hear of such actions in the mills of New England? I have not. The result is that while the Georgia mill is in position to sell its product today in line with the depreciated value of raw products, the New England mill has its manufacturing cost held up fictitiously and is forced to take heavy losses in current values or shut down."

When the strikes in New England started last January the Northern manufacturers were careful to point out the advantages enjoyed by the South. The Southern manufacturers endeavored to minimize these advantages and there was not a little heated verbal controversy on the subject. Edward Farnham Greene, a spokesman for the New Englanders, made a public statement pointing out that wages in the South were considerably lower than in the North, thus drawing upon himself the fire of Winston D. Adams, secretary-treasurer of the American Cotton Manufacturers' Association, of Charlotte, N. C. Mr. Adams contended that the cost of maintaining workers' villages in the South brought wages there virtually to the same level as that prevailing in New England. He quoted the National Industrial Conference Board as follows on average weekly earnings of textile operatives in both sections:

The figures show a slightly higher percentage of increase in the North.

	South	North
1914	$7.10	$9.02
June, 1921	13.99	18.71

And he added that the American Cotton Manufacturers reported that the company villages, in which cheap rent, free light and fuel are supplied to the worker, cost the manufacturers of the South $4.36 a week per operative in addition. This would bring the Southern wages up to $18.35, only 36 cents less than the Northern wages.

The New England manufacturers, however, refused to recognize this point of view. The Amoskeag mills at Manchester, N. H., in announcing the wage cut that caused the employees to walk out on February 13, said: "The textile manufacturers of the North, if they are to continue to operate, must meet the competition of the South, where the wages are 50% to 60% of those in the North, and where the working hours are from 55 to 60 hours a week." Later the company explained its position as follows:

"Working 48 hours a week, with wages at last year's levels, the company cannot turn out goods in competition with Southern mills. In consequence, many of the standard Amoskeag brands are being produced elsewhere at a lower cost, and it has been necessary to discontinue making them. . . . The peril of the South is that in 1900 it had 5,500,000 spindles; today the number is 15,949,000.

"In the last 20 years the number of spindles in Northern mills has increased from 15,700,000 to 20,776,000. The difference in rate of growth is largely due to the fact that at least 90% of the Southern mills are running on a minimum schedule of 55 hours a week, and many of them are operating 60 hours weekly.

"During last December, Southern spindles ran 239 spindle hours, as compared with 188 hours in Northern mills. In other words, Southern spindles were operated on an average of 11½ hours more a week than were the Northern spindles. . . . In an industry where competition is keen, this factor alone is fatal, for the fixed expenses, which amount to large sums yearly, remain the same whether the mills run 49 or 54 hours a week. By running 54 hours these expenses are reduced ⅛—the difference between life and death to a business dependent upon a large output and a narrow margin of profit."

These statements, of course, were intended to put the difficulties of the New England textile manufacturers directly up to labor. What has labor to say about it?

The unions replied that Southern competition was a bogey raised by the manufacturers for the express purpose of oppressing their workers. "We are prepared to show," said

Thomas F. McMahon, president of the United Textile Workers, "that where Northern mills claim they have Southern competition these Southern mills are mostly controlled by Northern capital."

The union, according to Edwin Newdick, writing in *Labor Age*, made the following statements in paid advertisements attacking the propaganda of the mill owners:

"They showed that Amoskeag's capitalization has been increased from $4,000,000 to over $44,000,000 without contribution of a single dollar, except from profits.

"They showed that Amoskeag now has in surplus and quick assets a total nearly equal to its entire capitalization.

"They showed that Amoskeag paid out nearly $3,000,000 in dividends in the 'bad' year of 1921.

"They showed that Amoskeag paid out 409% *more* in dividends in 1921 than it did ten years before, in 1911.

"They showed that Amoskeag earned in net profits 139% *more* in 1921 than it earned in 1911.

"They showed that Amoskeag paid out in dividends in 1921 about $1,250,000 more than it earned—withdrawing the balance for dividends from surplus.

"They showed that Amoskeag made 139% *more* profit in 1921 than in 1911 *on the sale of only two-thirds as much cloth.*

"They showed that $100 invested in Amoskeag 25 years ago would have yielded $670 in dividends to date.

"They showed that $100 invested in Amoskeag 25 years ago would also have yielded its possessor stock now worth $1175.

"They showed that the profits of Amoskeag per dollar of sales averaged 47% higher in 1912-1916 than in 1907-1911.

"They showed that the profits of Amoskeag per dollar of sales were *higher in* 1921 *than the five-year average of* 1907-1911.

"It was shown that, during the last 20 years, all the Fall River mills, for which financial records were available, including 26 of the largest mills, had averaged 8.4% on capitalization.

"Figures were presented covering the earnings of every textile mill in Fall River whose stock is listed, 36 in all, showing the profits from the beginning of 1917 through the first quarter of 1922. At this very time when the industry of New England is screaming for help, shaking with palsy at Southern competition, cutting wages and begging for longer hours, these 36 Fall River mills averaged for the first quarter of 1922 dividends totaling over 11% per annum on their capitalization. This capitalization has been increased by more than 25% since the beginning of 1917, practically all by stock dividends, that is, capitalization of profits.

"Since the first of 1917, these 36 Fall River mills have paid over 83% cash dividends on their capitalization. On their capitalization of January 1, 1917, these mills have paid since that date cash dividends of 96.97%. That is, the stockholders of these Fall River mills have received in cash, dollar for dollar, virtually the full capitalized value of the properties since January 1, 1917—more, in fact, if allowance is made for any interest on dividend money deposited or reinvested."

It will appear immediately to most business men that, even if these statements of the union are true, it does not follow that the Northern cotton mills can continue their present wage scale and yet stay in business. As long as the demand for cotton cloth is less than the combined output of both Northern and Southern mills, the mills which can operate least economically will be forced out. It doesn't matter how large the dividends were that those mills formerly paid. It doesn't matter if the mills made 500% profit last year. If their costs are higher than costs elsewhere, and there is keen competition for a market, they must cut their costs or quit.

Northern Mill Owners' Viewpoint

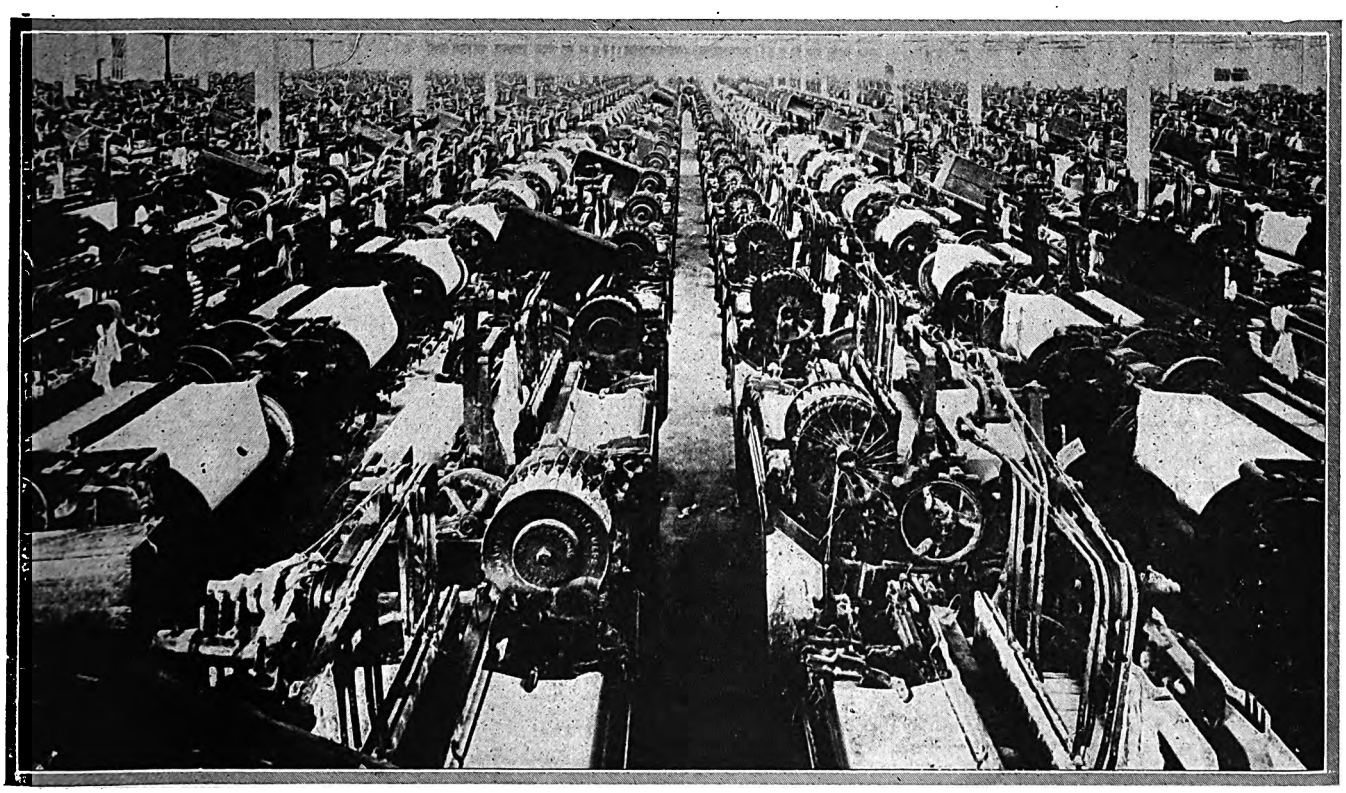
THE New England mills, realizing this, have refused to arbitrate the wage reduction. They have stood firm, declaring that their business life is involved. In a statement rejecting Government offers of arbitration they said:

"The question of wages in the present state of cotton manufacturing is simply a question of keeping the cost of goods produced by our mills within the price for which that product can be sold. Unless we can do this at once we must very soon close our mills. It is not a question of reducing wages to increase profits, for in most cases there are no profits nor have there been for months past, nor will there be, so far as we can see, for an indefinite period to come.

"It seems to us that it would not be fair dealing to agree to arbitration when we know that we could not, if we would, carry out its award, if that award increased the wage scale which we have offered. . . .

"The scale of wages that it is possible for industry to pay cannot be determined academically; it is fixed by conditions

(Turn to page 1180)



"The hall of a thousand looms" is not a figure of speech in this cotton mill in Lawrence, Mass. There are actually a thousand looms within the area shown in the picture. *(© Galloway.)*

Will There Be a Rail Strike?

More than a million men will be affected by the wage reduction—rail workers join forces with miners to fight cuts

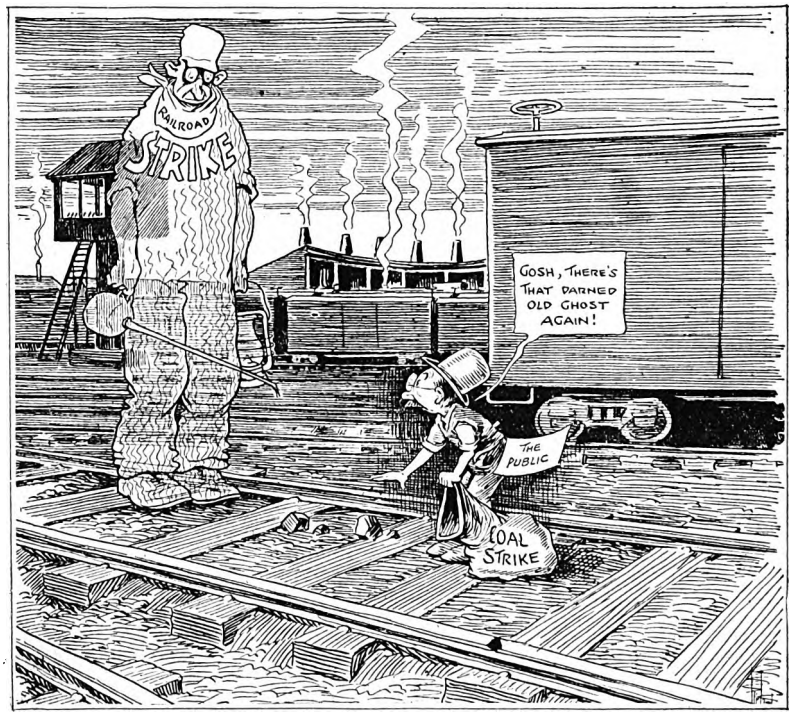
WILL there be a rail strike on July first? Or will the rail workers affected by the recent decisions of the Railroad Labor Board decide it is wiser to accept the cut in wages than to gamble on the chance of winning the strike?

The wages of 1,225,000 railroad men were cut by an annual amount totaling $135,000,000 by the recent ruling of the Labor Board. First the 400,000 maintenance-of-way men were affected by a ruling reducing their wages $48,000,000 a year. Then 500,000 members of the shop crafts unions were notified that their wages were to be cut $60,500,000 a year. Finally, the 325,000 clerks and station men on the country's railroads were advised that a reduction of $26,500,000 would go into effect July first.

The leaders of the various rail unions, though expecting that some reductions would be made, were surprised that the wage-cuts were so large. The union executives immediately protested and prepared to take a strike ballot to determine the attitude of their members toward fighting the order.

In a letter to the Railroad Labor Board, signed by B. M. Jewell, president of the Railway Employees Department of the American Federation of Labor, and by the president of the ten associated unions affected by the rulings it is asserted that the decisions of the Labor Board constitute a clear violation of the provisions of the Transportation Act.

"The right to at least live is fundamental," says the letter, "but your decisions deprive a large number of railroad workers of even this elementary right. Men in America cannot be expected to work for public utilities only to see their children undernourished and doomed to a premature death, or if they do survive the almost intolerable conditions imposed by your decisions, to be destined to go through life without an education or the opportunity to realize a healthy and decent existence. . . . Your further statement that you will give consideration to the living-wage principle when the railroad properties are financially rehabilitated is not reassuring. You thus give further confirmation of the fact that your entire attitude is one of subordination of human rights and standards to property rights. Moreover, the necessity of living cannot be deferred. The Congress or the people of our country do not expect railway employees to be exposed to poverty, starvation and suffering, pending the time when the railroad bankers have rehabilitated the railroad property at the expense of the public, and of the railway employees. In this connection, we are also reminded of the fact that in May, 1920, when the volume of traffic of the railroads was unprecedented, you refused to give consideration to our request for a living wage.



(Columbus Dispatch)

Haunted by the perpetual ghost.

"Railroad labor costs have constantly declined during recent years. High operation costs are due to the delinquencies of financial control. If the capital needs of the railroads were financed by the public and they were operated in the public interest, freight rates could be greatly reduced and wages to employees increased to the point where "living" and "saving" standards of life could be maintained. . . .

"Our attitude from the time the Labor Board was established up to the present has been, as you know, that in determining the wages of railway workers the Transportation Act assumed that the Labor Board would adopt the following basis of procedure:

"(1) That the section men, laborers and others at the bottom of the scale of occupation should receive a living wage, as the term is ordinarily used, or an amount sufficient to maintain themselves and their families in comfort and decency;

"(2) Other employees should receive differentials above this amount, extending upward, according to skill, hazard, responsibility, training and experience."

Similar expressions came from other union executives. But the following figures, which the Railroad Labor Board used in determining the extent of the cut, were quoted by those members of the board who rendered the majority report.

The Cost of Living in the Labor Board Decision

BASED upon the evidence before the board, the statistical department of the board has made a study of the comparative purchasing power of the wage herein fixed for certain of the shop crafts and the purchasing power of the wage paid such employes on the railroad in December, 1917, immediately prior to Government control of the carriers; in January, 1920, just prior to the termination of Federal control: on May 1, 1920, the effective date of Decision No. 2; on July 1, 1921, the effective date of Decision No. 147, and in March, 1922. The results of these studies are as follows:

Average Hourly Rates

	Machinists.	Car Men
December, 1917	50.5c.	37.7c.
January, 1920	72.3c.	68.0c.
May, 1920	85.3c.	81.0c.
July, 1921	77.3c.	73.0c.
Under present decision	70.3c.	64.4c.

Percentage of Increase in Average Hourly Rates Over December, 1917

January, 1920	43.2%	80.4%
May, 1920	68.9%	114.6%
July, 1921	53.0%	93.6%
Under present decision	39.2%	70.8%

Increase in Cost of Living Over December, 1917

January, 1920	40.0%
May, 1920	52.0%
July, 1921	26.7%
March, 1922	17.2%

Percentage of Increase in Purchasing Power of Earnings of Subsequent Dates as Compared with December, 1917

	Machinists	Car Men
January, 1920	2.3%	28.8%
May, 1920	11.1%	41.3%
July, 1921	20.8%	52.8%
Under present decision	18.8%	45.7%

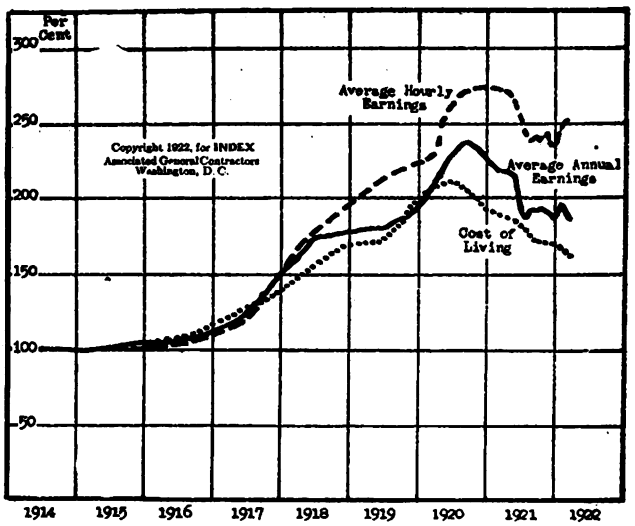
Although average hourly earnings of machinists are below the earnings after Decision No. 2 was applied, by 15 cents per hour, their value is 6.9% greater due to the decrease in the cost of living.

The average hourly earnings of car men are below the earnings after Decision No. 2 was applied, by 16.6 cents per hour, but their value is 3.1% greater for the same reason.

The cost of living figures set out in the foregoing tables have been compiled from the reports of the United States Department of Labor and are for the latest date for which such data are available.

The most serious factor in the situation is the possibility that the rail and mine unions may combine to fight the reduction. The railroad unions and the miners have an agreement which provides:

"When it becomes apparent that any one or group of our organization is made the victim of unwarranted attacks it will become the duty of the representatives of each organization to assemble and devise ways and means to be applied to best meet the emergency."



Railway employee earnings and cost of living. In July, 1920, it cost about $210 to buy as good a living as could be bought for $100 in 1914. The average railroad employee, however, although working fewer hours, earned $221 for every $100 he received in 1914. If he had worked at the same rate for as many hours as he did in 1914 he would have made $268. In Februarp, 1922, it cost only $162 to buy as good a living as could be bought for $100 in 1914. The average railway employee actually earned $186 for every $100 earned in 1914, but would have received $252 if he had worked the 1914 hours at the same rate.—*(Index.)*

Both the miners and the railroad workers, who have suffered wage cuts, believe they have been the victims of unwarranted attacks, consequently a conference has been held with a view to consolidating the two groups.

But that a return to normal industrial conditions cannot be expected so long as the present wage rates are maintained is the belief of the Railroad Labor Board, for the reason that railroad wages not only affect transportation costs but industry and production in general. In the recent ruling it was stated that in order to secure efficient service from the carriers it was necessary to give them an opportunity to profit by the revival of business so that they might expand their facilities. A strike, it was asserted, would not only result in losses to the rail workers and the carriers, but would likewise retard business recovery. Some members said that it would also defer the scientific adjustment of the "living and saving wage" to which the board in its decision said it could devote greater consideration when the "abnormalities" of the present time were over.

In a recent statement issued by the presidents of six Chicago railroads, it was asserted that all threats of a walkout were being inspired by union leaders. The statement was signed by H. E. Bryan of the Chicago, Milwaukee & St. Paul; Hale Holden, the Burlington; W. H. Finley, the Northwestern; J. E. Gorman, Rock Island; C. H. Markham, Illinois Central, and S. M. Felton, Chicago Great Western, and follows in part:

"Threats of a strike, made by leaders of the railroad labor unions, are appearing with such frequency that the time seems opportune for questioning the soundness of their talk. There is a very good reason for doubting whether the men themselves, that is, the railroad employees, really are in sympathy with resistance to the decisions of the United States Railway Labor Board.

"The public should not overlook the fact that in deciding the proposed wages of these employees, maintenance of way and shop, the Labor Board, which is a Government body, said 'after the reductions made under this decision—these employees in the railroads will be receiving, as a rule, a wage in excess of that paid to similar employees in other industries.'

"The board held in its opinion that measured by the present cost of living, the average hourly wages of machinists, for instance, after July 1, will still have 19% more purchasing power than in December, 1917; those of car men, 46% more purchasing power, and those of common laborers 45½% more. That is to say, measured by the cost of living, their wages will still be these percentages higher than at the end of 1917.

"An important fact which should not be overlooked by the public, because it may have a very important bearing on its business and comfort, is that whereas State reductions amounting to more than $250,000,000 have been ordered by the Interstate Commerce Commission the cut in wages, according to the decisions thus far rendered, amounts to only $110,000,000.

The situation, as far as the public is concerned, was further complicated by the agreement on June 20 between the presidents of the United Mine Workers and the Railway Employees' Department of the A. F. of L. to act in a "concerted economic action combatting wage reductions." Details of the plan were not made public, but the announcement said "We have no other recourse." If the plan goes through nearly 2,000,000 railroad and mine workers will be affected.

Although labor leaders assert there will be no compromise, it is regarded as significant that during the A. F. of L. convention at Cincinnati, there has been little discussion of definite plans for carrying on the strike. Although labor leaders speak of more than 1,000,000 being affected by the strike vote, when pressed for details, such as the names of the roads on which strike orders are expected to be issued, or the crafts on these roads, to which they will be issued, no information was forthcoming.

It is believed by Ben W. Hooper, the chairman of the Railroad Labor Board, that the railroads will voluntarily discontinue contracting out work in a short time, regardless of their opinions as to its legality, and that this will go a long way toward restoration of cordial relations between the carriers and their employees. He points out that neither wages nor rates are permanent because the conditions on which they were based are not permanent.

The rail workers know, too, that the sentiment of the public is against strikes, and that the fact that employees in other industries have taken cuts weakens their own case with the public.

Now Is the Time to Invest Abroad

Never have conditions so thoroughly justified the employment of American capital in Europe. The question is, How shall the money be spent?

THE field of foreign investment at the present time seems to offer greater opportunities to American capital than at any previous period in the history of the nation. Europe is desperately in need of capital, and we have surplus funds for investment. This situation of supply and demand, even if it were not attended by other favorable conditions, would make the time auspicious for the development of our financial interests abroad.

But foreign investment of American capital now means more than the carrying of surplus funds to a market that will pay well for the use of them. It will serve, in addition, three purposes:

First, it will contribute to the clearing up of the international industrial and financial situation, and thereby aid the recovery of American industry;

Second, it will pave the way for the payment of Europe's war debts to the United States;

Third, it will help America to obtain a lasting foothold in the markets of the world, so that our industries may always be able to dispose of their surplus products abroad.

One simple way in which the investing of American funds abroad will aid American industry by helping to clear up the international financial situation was explained in these words by an economic expert employed by one of New York's largest trust companies extensively engaged in international finance:

"Suppose France negotiates a $100,000,000 loan in the United States. A credit of $100,000,000 will be placed to the account of the French borrowers in New York banks. They will collect their money by buying franc exchange in the New York market, which will send the franc up. This will benefit American industry, for it will remove one of the obstacles to the recovery of our export trade, the low value of foreign money in terms of dollars. It will be easier for the French to buy here, for they will get more dollar value per franc.

"The actual transfer of the $100,000,000 from this side of the Atlantic to the other will be made partly in American goods and partly in gold. A certain amount of gold will be shipped in payment as long as the difference between the par value of the franc and the value of franc exchange in New York is greater than the cost of shipping a franc's worth of gold bullion. This movement of gold will benefit Europe, which needs more of that metal in order to stabilize its domestic currency, and it will not hurt the United States, which has more gold than it can use. The shipment of American goods will also help America, of course, and the approach of European currency to stability will also react beneficially on American trade."

What American Money Can Do

MORE important than this purely financial aspect is the effect that American investments abroad may be expected to have on the reconstruction of Europe's industry. American money can be used to rebuild factories which can help Europe to return to prosperity and help her to pay her debts to us. *Barron's Weekly* discusses the European debt problem as follows:

"At the present time the debt of Europe to the United States cannot be less at the most conservative estimate than $12,500,000,000. Interest alone on this vast sum at the low rate of 4%, less than any of it actually bears, would require $500,000,000 a year, more than the average 'favorable' balance of trade of the United States with all the world in the first decade of the present century. How shall this great amount of interest, to say nothing of any payments on the principal, be paid?

"It must be clear that payment in goods is impossible, at least for some time to come. The United States comes very close to being self-sufficing economically. We can supply ourselves with raw materials and with manufactures independently of the outside world. There are a few luxuries, a few raw materials, a few manufactures which we shall buy from Europe, but they are more than balanced by the goods which Europe must have from us, leaving nothing to apply on interest or principal of the debt. Of gold we have more than our share already. Europe may pay something in services, particularly in transporting our products over all the seven seas in European bottoms. The determination of the American people to have their own merchant marine, however, probably means that we shall have less use for these services today than before the war.

"In the long run, we must take our pay in goods if at all, but it is evident that the economic dislocations involved in a sudden shift of the balance of trade make it imperative that the change be brought about gradually. In one way only is this possible—through the medium of foreign investments of America's great wealth. By exporting capital in large amounts we shall enable our debtors to reconstruct their shattered economic and financial systems, regain their pre-war earning power, place themselves upon a basis where the repayment of their debts to us will be possible for them and convenient for us."

"Bread on the Waters"

THE third way in which the investment of American capital abroad will benefit our industry is by enabling us to obtain a foothold in the markets of the world. England and other nations which in the past have played dominating parts in the world trade have used their financial advantages to help their exporters. The presence of English capital in China, for instance, makes it easier for Englishmen to sell goods there. If you own shares in the factories of a foreign nation your attempts to supply them with their raw materials or with semi-finished products for further manufacture will certainly be facilitated. An opportunity to place herself in such a position is now before the United States.

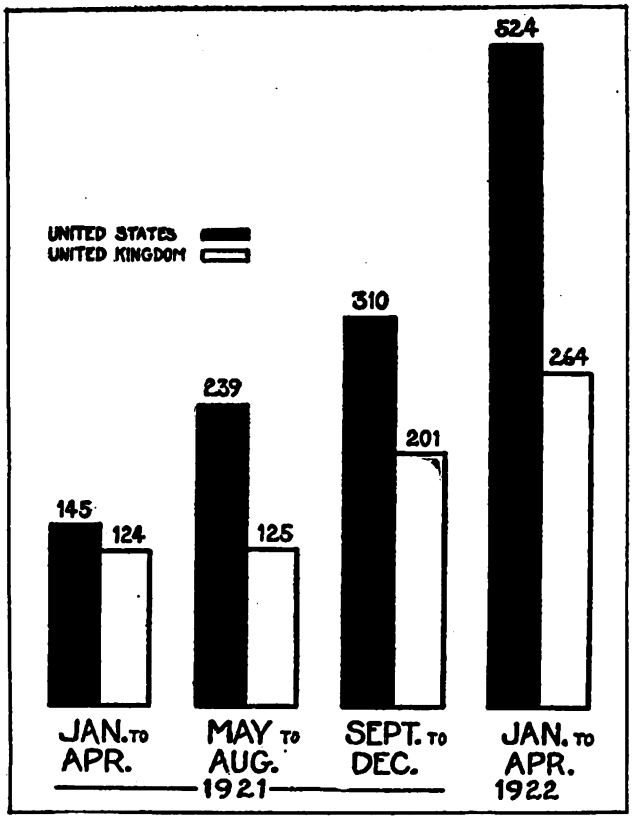
Most of the opportunities for foreign investment that have been placed before American investors up to the present time have been government bonds. The greatest opportunity, however, does not lie along these lines, but in the purchase of securities of foreign industrial corporations.

Not many loans to foreign corporations have yet been floated in the United States. The first important attempt along this line, according to *Barron's Weekly,* was the flotation of a $15,000,000 issue of Central Argentine Railway convertible 6s, 1927, offered to the American public just before the United States entered the war. This offering was not very favorably received, in spite of the facts that the Central Argentine is an especially profitable property and that investments in Argentine rails have been among the most successful ventures of British capital abroad. The coldness of the public to this loan, and the preoccupation with United States Government financing that followed our entry into the war prevented further attempts along this line. In 1922, however, investment bankers began once more to sell foreign corporation bonds here. The list of offerings, all of which were successful, includes bonds of an Australian public utility, a Brazilian railway, a French steel corporation and a Dutch shipping concern. More such offerings will undoubtedly be made in the immediate future.

From the point of view of developing markets for American industry the entrance of American capital into manufac-

turing ventures abroad is more important than investment in bonds. American corporations have already done much in this direction. The International Harvester Company has factories in many foreign countries, including Russia, and Ford maintains plants in Europe. The big packers own property in South America. Two American manufacturers of jute bagging and twine have opened factories in India, near an important source of their raw material. Building construction work in the East has been undertaken by such engineering concerns as Stone & Webster and the George A. Fuller Construction Co. The Standard Oil Co. of New Jersey has interests all over the world, and Chile Copper is helping to exploit the mineral resources of South America.

"With increasing intensity of competition for world trade, it may be expected that American corporations will extend their operations on foreign soil to a still greater degree, with profit both to themselves and to the nations in whose development they will thus assist," says *Barron's Weekly*.



Volume of foreign financing in the United States and in the United Kingdom, in millions of dollars (pounds converted at current rates of exchange).—(Federal Reserve Bank, N.Y.)

Even less has been done in the way of selling shares in foreign corporations to the general American investing public than in selling loans of such corporations. Kuhn, Loeb & Co., however, has achieved something along these lines. Since 1916 they have issued and sold blocks of stock in the Royal Dutch Co., the Shell Transport & Trading Co. and the DeBeers Consolidated Mines, Ltd. They used the method of issuing "American shares" in these foreign corporations against the deposit of the original stocks of the companies with an American trust company. Dividends on the "American shares" are payable in dollars equivalent to those received by the trust company on the original shares. In no case do the "American shares" represent more than 10% of the total capitalization of the foreign corporation.

Not long ago some of the stock of the Rotterdam Bank was successfully offered unchanged in form to the American public. Another form of foreign investment is illustrated by the purchase of cotton mills in Szecho-Slovakia with a capacity of more than 200,000 spindles by a group of New England business men.

U. S. As World's Investment Leader

THE United States has already obtained a good start toward becoming the world's greatest investment nation. That position is now held by Great Britain, but America is gaining rapidly. We have been absorbing large quantities of foreign government securities for a longer time than most persons realize.

"From 1904 to 1913 foreign government notes and bonds floated in New York aggregated nearly $300,000,000, of which about one-half were Japanese loans issued in sterling," says a report of the National Bank of Commerce. "This total does not include Canadian municipal securities, which were absorbed in large amounts by this market. The war diverted the course of international finance from established channels and increased the needs and borrowings of other nations from the American market, but the developments under peace conditions would have been along similar lines.

"Below in the tables shown is summarized the reported external financing carried out in the United States from 1919 to 1921.

"America will not have matters all her own way in world finance. There is severe competition ahead. Improving money conditions abroad, particularly in London, where there has been a marked lowering of rates, will increase effective rivalry with this country.

The favorable position of the dollar among the currencies of the world has made foreign borrowings here particularly advantageous in the past few years, but as the premium on the dollar declines, this advantage will be reduced.

International competition demands the further development in America of sound foreign investment experience and judgment, the training of skilled personnel to handle this business, and, above all, it will demand particular discrimination to guard the American investor against unwise securities.

On that basis only can a substantial and enduring capital market be maintained in the United States."

	1919	1920 (000 omitted)	1921
Foreign government other than Canadian municipals..	$514,679	$291,000	$385,270
Canadian municipals	93,637	53,278	75,982
Municipals of U. S. possessions	11,700	16,277	25,274
Totals	$620,016	$360,555	$486,526

"The tendency of the American market to absorb increasing amounts of foreign issues is shown more clearly in the following figures, showing the growing amount of new money in the above totals:

	1919	1920 (000 omitted)	1921
Refunding	$359,129	$107,498	$50,000
New loans	269,887	253,057	436,526
Totals	$620,016	$360,555	$486,526

The opinion has been expressed in American industrial circles that foreign government loans should be floated in this country only on condition that the money so raised be spent here. American manufacturers are hard-headed men, and many of them see no reason why this country should lend money abroad to be spent abroad. They want to be assured by a clause in the loan agreement that this country will benefit by the loan.

The international bankers who are most directly interested in fostering America's foreign investments do not believe it would be sound economics to lend money with strings on it. They feel that Europe will get more benefit from a loan if she is permitted to spend the proceeds wherever she can to most advantage to herself; and they argue that anything that will increase the speed of Europe's recovery will help us more than we could help ourselves by forcing Europe to buy of us against her own true advantage. Further, they say that the tangle of international exchanges and currencies will not get the full benefit of the loan if it is encumbered with provisions as to where the money shall be spent. Finally, the bankers say that if we insist on such conditions Europe will simply try to get along without our money and the opportunity will be lost.

Who Advises You on Investments?

Do you place money in a business on advice of your lawyer, banker, a "business friend" or a certified accountant?

"IT'S surprising how much trouble the average business man has with his investments," said the certified public accountant. "If he finds himself with a little capital beyond the requirements of his business he runs into all sorts of difficulties in the attempt to place it properly.

"More often than you suspect, a man who is unusually clever in his own line gets stung when he tries to invest on the outside. I am not speaking of the man who is content to lend his money at the prevailing rate of interest with unimpeachable security. Most business men are not satisfied with that. They get more for their money in their own business, and, being business men, they naturally think they ought to be able to get more for their money under all circumstances. Government bonds and securities legal for savings banks are all right for widows and orphans, they think, but for men with an understanding of the business world better things are available.

"But a good business investment is hard to find, and most men are not equipped for the search. They flounder around, following up tips offered by their friends and asking their attorneys to investigate this, that and the other proposition, and often they end by making an investment they are sorry for later or by deciding that securities good enough for a widow are good enough for them, too."

* * *

Indications of the truth of these remarks may be found in the "Business Opportunities" columns of the newspapers. Persons who advertise for capital these days get replies in large numbers. They don't always get the capital, but they are sure to get plenty of interviews with business men who have capital to invest, and wish to look into the proposition advertised. If you don't believe this just insert an ad reading

> INVESTORS with $10,000 each wanted to back an established business that is ready to expand. Successful record. Investigation invited. S-567 Bugle, Downtown.

and see how many replies you will get. If you have inserted the ad in the right newspaper the chances are ten to one that you will find a dozen or more persons who are willing to accept your invitation to investigate.

The extraordinary activity these days of promoters with new stocks to sell is another indication of the large amount of money that business men now have on hand to invest, and the difficulties they are experiencing in finding suitable places for their capital. The stock promotion game is flourishing now to an unprecedented extent. It grew great during the past year just as the bucket-shop business grew; but unlike the bucketing trade it has not been seriously damaged by public clamor. Its high priests operate in richly equipped and spacious temples, in some cases occupying several floors of large New York office buildings, from which they send out hundreds of high-power salesmen, trained by the latest methods of inspirational sales-education, to gather in capital seeking investment.

They do a legitimate business, selling shares in new enterprises. They don't, of course, tell their customers how small a proportion of the new enterprises launched each year ever become successful; but of course you cannot expect a stock salesman to tell his customers any such thing. And any one of these promoters will tell you, and back up his statement with evidence, that he is not selling exclusively to ignorant immigrants, but that a large part of his clientele is made up of business men.

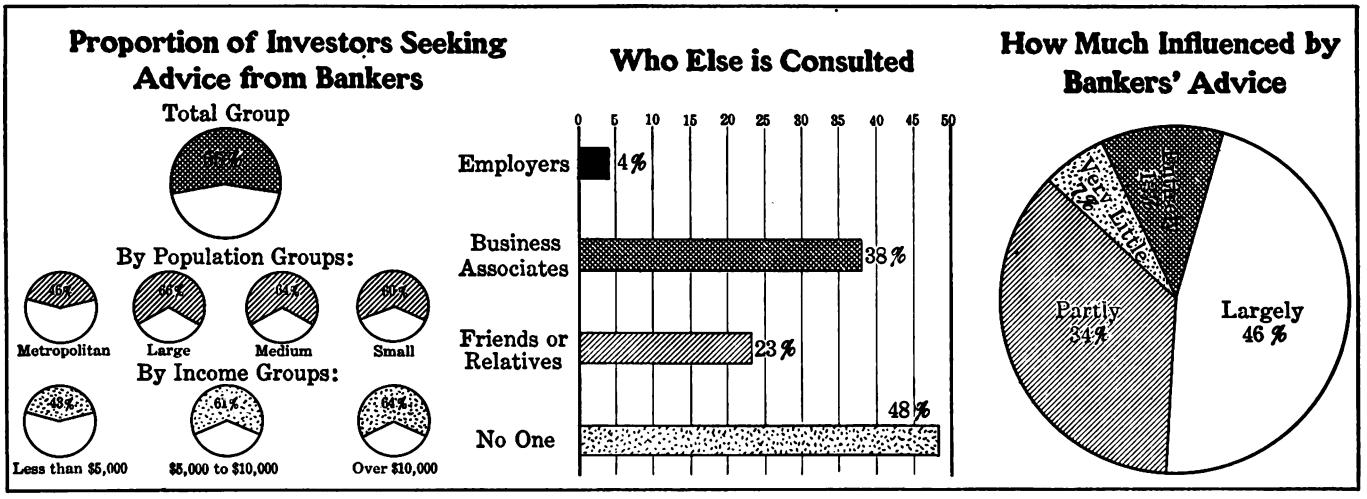
The reason for this, of course, is the same as the reason for the increased activity in the markets for established stocks and bonds. The slackening of trade has released for investment large sums which otherwise would be more profitably employed in the investor's own business.

How does a business man go about his quest for a profitable investment outside of his own business?

How Business Men Invest

HE can go to a business broker, who is interested in getting his money from him and whose advice is therefore not to be relied upon entirely. He can ask his business acquaintances if they know of anything, but their judgment is not always to be trusted. He can ask his lawyer to investigate a proposition for him. He can seek advice from his banker, who will probably recommend that he keep away from "business opportunities" and buy conservative bonds. But none of these methods is quite satisfactory to a business man who feels, quite rightly, that he should be able to find a sound investment for his surplus funds that will hold out to him the

(*Turn to page 1180*)



These charts shed interesting light on pre-investment activities. The bar "No one, 48%" and the segment "Partly, 34%" should be considerably reduced.

Farmers As Factory Employees

Will industry turn to the country town as the ideal location for manufacturing plants so June farmers may be December mechanics?

WHAT would you give, Mr. Manufacturer, if you could have a steady supply of labor available at your busy season, out of your way in slack times, always consisting of the same contented personnel, and living happily on an income that is not entirely derived from you? Wouldn't that be a fairly satisfactory state of affairs?

But perhaps your labor problem has already been solved. Perhaps you are so much luckier than the rest of us that you can always get the right kind of hands at the right price whenever you want them. In that case you needn't bother to read this article, which is a discussion of a visionary scheme for helping to cure the labor troubles of American industry, and at the same time help solve the farm problem, the problem of city congestion and perhaps a few more of the difficulties of civilization.

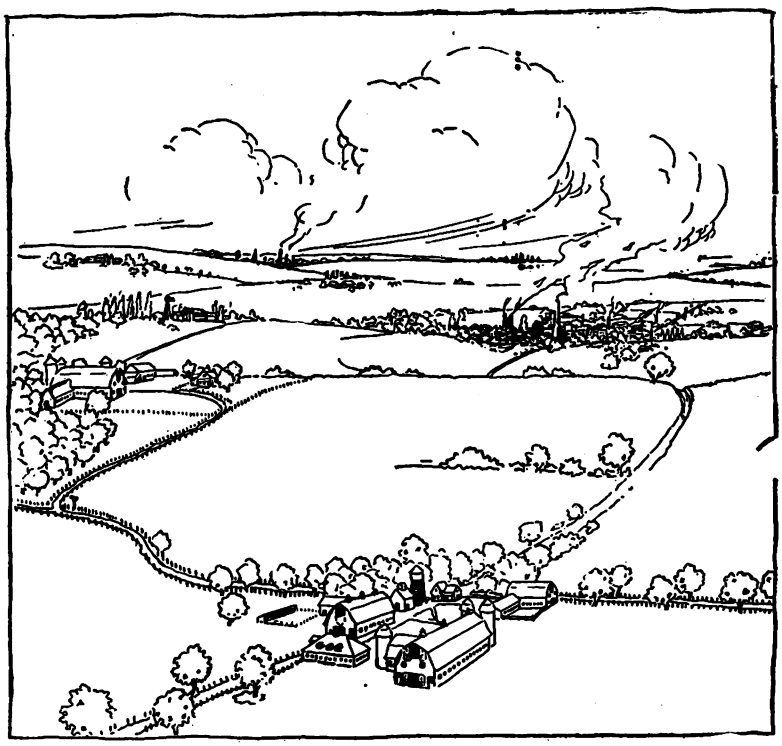
The author of the idea is Henry Ford. Mr. Ford's mind is productive of many ideas for the solution of the world's troubles. Not all of his schemes are regarded highly. But in discussing any idea of his relating to the labor problem it is worth while to remember that Mr. Ford is a highly successful manufacturer, and that his record for success with his own labor is hard to beat.

Mr. Ford's scheme is this: Let us combine factory work with farming. Let us locate our plants in country neighborhoods, and encourage our employees to own and operate farms. With the aid of modern mechanical methods they will be able to finish their agricultural duties in a short period every year, and they will have the rest of their time for factory labor. They will thus be stably attached to the plant, able to make a part of their living outside the factory, and relieved of the monotony of continued work at one job.

In an interview with Bernard L. Johnson, editor of *Farm Mechanics*, Mr. Ford explained his scheme, speaking, of course, from the farmer's point of view.

"The time will come when every farming community will have its local shop and industry where the farmers can employ themselves productively for the 200 days and more each year when there is no work to be done on the farms.

"As I see it, the farm homes of the future will be grouped in villages where modern conveniences can be enjoyed cheaply and where the workers can find profitable employment about nine months of every year when there is nothing more to do out in the fields. In the spring and again in the fall, when field work is to be done, the tractor and implements will be loaded onto motor trucks and quickly hauled to the job. The work will be quickly done and the implements returned to proper storage."



Farming country of the future will be dotted with small manufacturing towns.

It is hardly fair to call this idea a scheme. It is rather a prophecy, setting forth what may be expected to take place in the natural course of events—a favorable situation, the advent of which can be aided by those who would benefit by it.

It is a vision. It seems unreal, and yet it is not unrelated to the facts. The application of machinery to farming has actually made it possible, under favorable conditions, to get farm work done in time that would have seemed unbelievably quick to the last generation. Our cities are uncomfortably overcrowded, and the last Federal census seems to indicate that the flow of population to the cities, while not checked, is at least slowing down. There is an increasing tendency for industrial concerns to locate in country districts. Farmers are taking more and more interest in things outside of their immediate sphere. All these facts dovetail with Mr. Ford's idea, and indicate that perhaps the trend is actually in the direction which he indicates.

Not far from his automobile factory Henry Ford runs a farm along the lines of his vision. Men from the factory are sometimes employed on the farm, and vice versa. By using plenty of machinery he gets his farm work done in record time. Last year he harvested a 2,500-acre crop of winter wheat in five and one-half days. Behind the tractors that drew the reapers was a line of plows, and as soon as the crop was in the barns the fields had been turned over for the next year's seeding, and the labor that had done the job was available for a winter's work making automobiles.

Is it feasible to locate industry in the country? Why not? A factory must, in most cases, be on a railroad and conveniently located in regard to its sources of raw materials and its market; but these conditions can be, and often are, fulfilled in locations near good farm lands.

When large corporations create towns in which their workers can live they usually encourage the men to cultivate little garden plots behind their houses. There is a great difference, of course, between a garden plot and a farm, yet to urge workers to grow their own cabbages is a step, however small, in the direction of Mr. Ford's ideal condition.

If that condition could be made to prevail, it would be wonderfully beneficial for all hands. It would mean satisfied, cheap labor for the manufacturer and a fuller, happier existence for the combined farmer and factory worker. It is a vision for the future. Mr. Ford's idea may or may not be practical. It is at least worth thinking about.

Credit Supply's Effect on Business

A new theory of economic cycles, based upon the influence which the supply of commercial credit has upon the volume of business transacted

AN advocate of the science of forecasting business conditions, Clayton A. Penhale, of the Standard Statistics Company, writing in the *New York Tribune*, presents an interesting new aspect of the cycle theory. Cycles must be measured in terms of something or other—in bank clearings or car loadings or basic commodity prices or index numbers of one thing or another, but the author of the new theory regards *credit supply* as the most perfect barometer of business conditions and the stock market.

The theory is based on the idea that the underlying force behind all broad movements in the stock market and business is the supply of available credit. A condition of plentiful credit precedes every upward movement in the stock market and every broad increase in business volume. And credit stringency is the unfailing precursor of every great downward swing in security prices and business activity. Stated another way, prosperity and depression are reflexes of available funds.

The vessel at the left represents the credit reservoir—that is, the banks of the country plus the rediscount facilities of the Federal Reserve Banks.

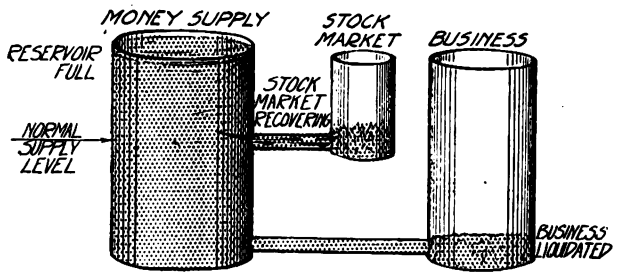


Fig. 1. This condition has been witnessed, during recent years at the following times: March, 1904; March, 1908; January, 1915; May, 1919, and June, 1921.

At this stage it is time for taking a bullish position on stocks, for with the credit supply plentiful and with business and stocks both liquidated there is only one way for stock prices to go.

On the business side commodity prices are low, with little demand, and trade prospects, on the surface, look black. But sound conditions have been restored by the preceding liquidation, and the first harbinger of recovery in business, the beginning of a rising stock market, is seen.

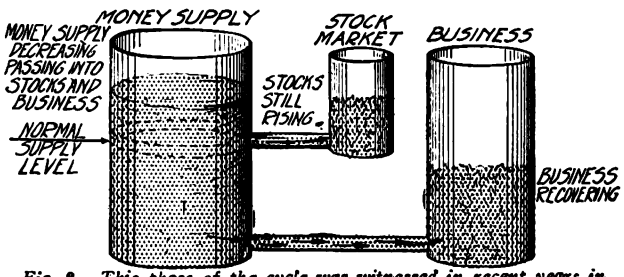


Fig. 2. This phase of the cycle was witnessed in recent years in September, 1904; December, 1908; September, 1915; July, 1919, and June, 1922.

Stock market conditions at this stage are still bullish. Business is still depressed, but some of the key industries which lie at the base of all business are picking up rapidly. At this stage hardening money rates and the extent of the previous rise in stock prices may entirely mislead the timid investor into selling securities prematurely.

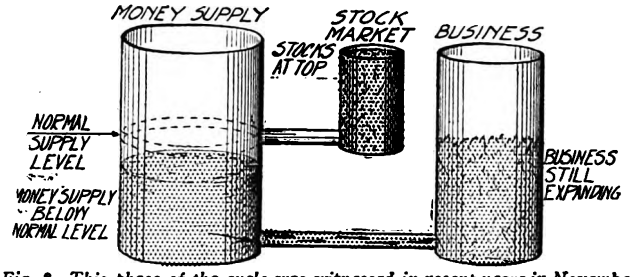


Fig. 3. This phase of the cycle was witnessed in recent years in November, 1905; December, 1909; December, 1916, and November, 1919.

It is at this stage that the time comes for taking a positive bearish position on stocks. This is the typical period of active bull manipulation to distribute stocks. Extra dividends, "melon cuttings" and other devices are used to induce the public to buy. But stock prices have discounted all these.

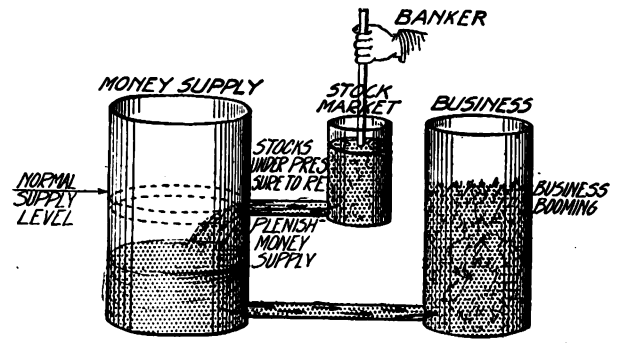


Fig. 4. This condition obtained in April, 1907; March, 1910; January, 1917, and April, 1920.

At this stage, the bear movement in the stock market actually begins. Business continues to expand on the credit supplied by the liquidation in stocks, but the credit supply is, nevertheless, nearing the point of exhaustion. The strain soon will become acute. It is a period of stiff money rates. This period is marked by forced liquidation in the stock market to supply the funds for continued business expansion. Stock prices, of course, reach a peak and begin to fall as the liquidation proceeds.

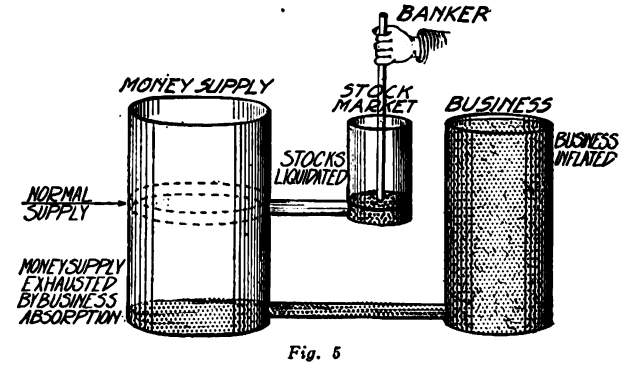


Fig. 5

The stock market has been largely liquidated at this stage of the cycle, while business has expanded until its demands for credit have drained the credit reservoir. The inflation has gone as far as it can and the banking situation is so strained that pressure on business is imperative. Consequently it becomes necessary to squeeze the business sponge.

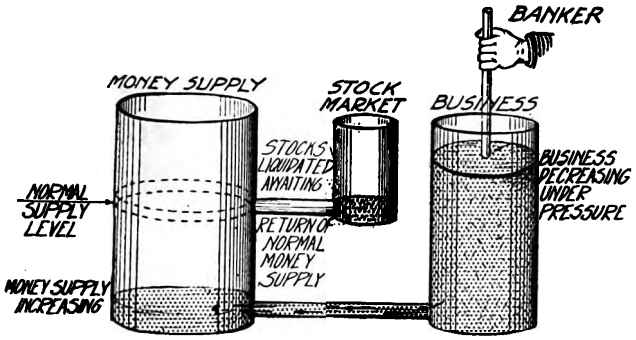


Fig. 6. This phase has been witnessed in December, 1907; June, 1911; November, 1917, and December, 1920.

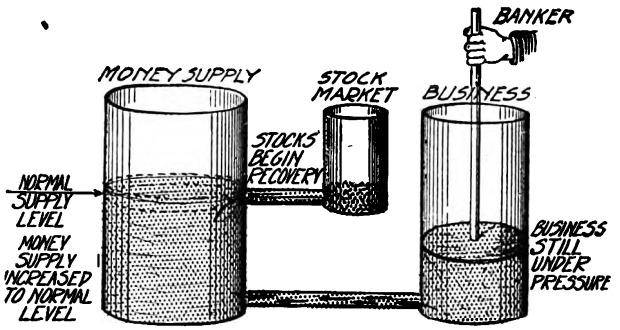


Fig. 7. This phase has been witnessed in March, 1908; September, 1911; January, 1918, and June, 1921.

Loans are reduced to a minimum and this period becomes one of premature bullishness on the stock market. The demand for basic commodities is falling off rapidly. There is decreased output and unemployment results. Along with falling commodity prices, business reaction becomes acute. The banks apply pressure on business to restore the credit supply, with the result that the credit current is reversed, passing from business into the banks. The stock market remains depressed, awaiting the increase in the credit supply.

This is the time for again taking a positive bullish position on the stock market, for the long pull. Business is still under pressure, but the end of liquidation is in sight. The credit supply has been restored to the normal level and such further liquidation as will take place will refill the reservoir.

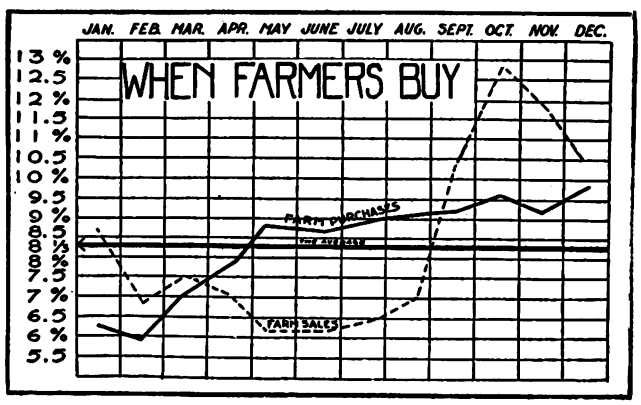
Thus the cycle is complete. The question remains, however: "Where do we stand today?" The answer is: "Somewhere between periods 1 and 2." The prospect is that the trend of the stock market will remain upward for some time to come.

When Do Farmers Buy?

THE steady advance in the prices of farm products has brought the great basic purchasing element of our country back into the market again. When it is considered that the farmer represents practically 35% of the "ultimate consumer" population, and that the Department of Agriculture estimates the increased purchasing power due to the rise in farm products to be almost 25%, the importance of this statement will be understood.

According to the *United Business Service:*

"The purchasing ability of the farmer depends on three factors. These are (1) the size of his crops, (2) the price he receives for what he sells, and (3) the price he must pay for what he buys. According to present indications, prospects are that all of these factors will tend to make the farmer's conditions more favorable. The price at which crops will surely be above the levels of the past two years. It must also be remembered that the farmer's producing costs have been somewhat lowered. Labor, equipment and interest costs have been reduced. While it is true that general prices have advanced of late, the rise has occurred chiefly in raw materials and food prices. Since the prices of finished products are slower to advance than raw material, the farmer will continually be benefited by any exchange he makes by selling crops and buying the finished products which he needs. In other words, the rate at which farm prices have been advancing has not been offset by an equal advance in the prices of the commodities he purchases. The exchange leaves him an increasing margin of profit. While the chart of his purchases shows that the farmer does most of his buying in October and December, the present is none too soon to begin the preparation of plans and campaigns in his behalf. The first essential in selling to the farmer is to get his confidence. The most effective way of getting this confidence is to talk to him in terms of the business of farming. His business is growing things, and being nearer the soil he is more human. Therefore, build sales talk on a foundation of genuine sincerity.



The farmer can be most easily reached through simple human appeals than by a formidable array of facts. A questionnaire recently mailed to the farmer in regard to the kind of advertising he read with most interest placed the newspaper first and circulars second.

We are, however, inclined to favor the direct-mail method of appeal. The farmer is more susceptible to a letter than is a business man. He gets fewer of them. Furthermore they are read in the evening with more undisturbed attention."

Pickling Newspapers

AFTER eight years of experimenting by three big New York newspapers at a cost of $5000 a year each, the problem of preserving newspapers in public libraries has apparently been solved, according to the American Pulp and Paper Association. Each newspaper sheet is mounted between two sheets of thin Japanese tissues, shutting the air from the original sheet, slightly reducing its legibility, but strengthening the page. Bound volumes of the mounted pages are now in constant use.

Oil from Our Northern Neighbors

As the oil reserves in this country become more limited, new sources of supply must be found—Canada has oil in plenty though little has been utilized.

OIL is one of the world's greatest needs. Sixty per cent of the total supply is now produced in the country, but the United States fields are becoming exhausted, and geologists expect their early decline. When our petroleum is used up where will the bulk of the world's oil come from?

A large part will undoubtedly come from Canada, whose oil fields have enormous potentialities. In western Canada are petroleum territories which have scarcely been tapped, but which, when they are developed, may make our northern neighbor one of the foremost oil-producing countries of the world.

According to latest Government statistics, Canada's annual oil production up to date stops short of 310,000 barrels (90% from the Ontario fields) in comparison with more than 330,000,000 barrels produced by the United States. A leading United States geologist, Dr. J. D. Northrop, recently said, "Petroleum production in the United States is expected to reach its maximum this year and to decline steadily hereafter," while the same authority, speaking about the future of the Canadian resources, continued, "Canada is the only country in which the petroleum industry may be said to be controlled by foreign (United States) interests."

If we take a map of Canada and very roughly draw a line from east of the Great Slave Lake, passing through Lake Athabasca down to the north end of Lake Winnipeg, along the east shore of that lake to its southerly end, thence to and along the north shore of Lake Superior to the Soo, and thence along the northerly shore of the Georgian Bay to Parry Sound, thence due east to the St. Lawrence River, and along the northerly bank of that river to its mouth, we shall have divided the Dominion into two vast areas, that lying to the northward of our line being regarded as generally hopeless for oil prospecting, that lying westward and southward being from its geological formation rich in promise for the finding of productive oil fields within the economical range of practical drilling.

If we further examine the geological map of this latter area, we find that the great oil-bearing strata of the North American continent, which in the United States have been productive of the richest and most prolific oil reservoirs of the world, contributing in fact more than 60% of the world's total oil supply, constitute the principal geological formations and outcrops of this vast Canadian territory.

All of these geological formations in the various oil fields of the United States contribute to the vast total production of the country.

It requires, therefore, no more than an average share of optimism to predict that Canada's future as a world oil producer is certain, and awaits only the assured result of time and capital expended on the scientific location of favorable structures of these formations and their subsequent exploration by the drill.

In the western provinces attention in the past has chiefly been divided between the possibility of commercial development of the Athabasca River, commonly called the "Tar Sands," and the search for petroleum in the vast regions of the Mackenzie River basin, north and south of Edmonton, in northern, central and southern Alberta, in the Peace River and Great Slave Lake districts, while recently reports are to hand of organization for prospecting and drilling in the districts of Kootenay and Vancouver, B. C.

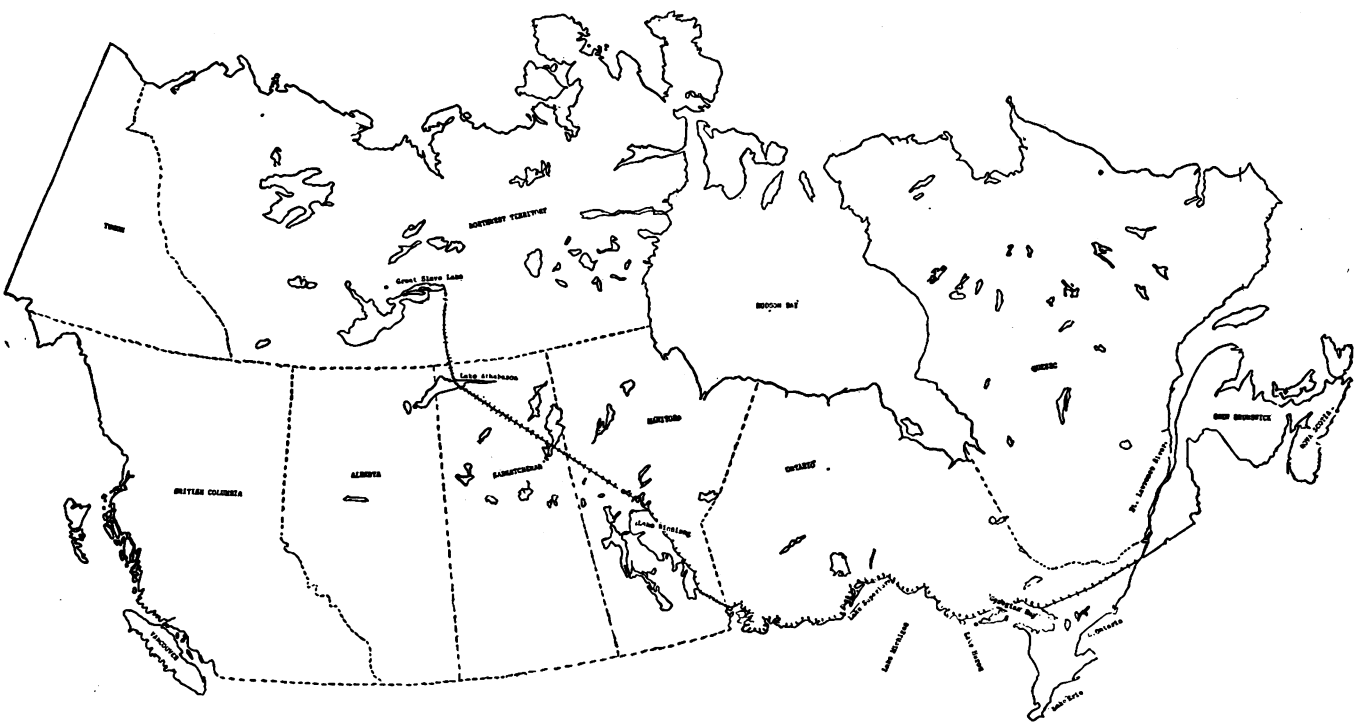
The outcrop area of the Athabasca "Tar Sands" has been estimated to cover from 750 to 1000 square miles, and the deposits probably extend considerably further to the southward under heavy cover. Various estimates have been made of the probable oil content of these sands, which have been reported to range in thickness from 140 to 225 ft., and to contain 25% of oil, but in fact the numerous shallow wells drilled have only obtained small amounts of black viscous oil showing on analysis a high percentage of light oils. The more volatile and valuable constituents of this petroleum have long since disappeared and, as the flow has ceased, the rocks from which it issued are probably exhausted; in short, these tar deposits are all that remain of a vast oil reservoir now spoiled and wasted. Further, the horizontal stratification of these deposits, according to scientific men, is entirely against the probability that they will in themselves be found to contain reservoirs holding large pools of pay oil, since the entire absence of folding in the strata is unfavorable to the large accumulation of such reservoirs and, moreover, denudation by ancient glacial action has exposed the oil sands to the atmosphere, so that in the course of ages evaporation of the lighter oils has taken place, leaving only the heavy tarry residue, now in evidence, dispersed throughout these vast deposits.

Hence it is likely that for years to come the commercial value of these tar sands will be limited to their development as bituminous road-making material, for which purpose their suitability has already been demonstrated in the city streets of Edmonton, and the economics of the question are being fully investigated by the Department of Mines of the Dominion of Canada. Improved methods of distillation may make the recovery of the oil content of these deposits a commercial proposition, as also may the future exhaustion of producing oil wells, but this latter is too far in the future to be of interest to the present generation.

In the Athabasca district, at Pelican Rapids, the Canadian Geological Survey sunk a shallow well in 1897, and tapped a heavy flow of gas, and later, at the same place, the Pelican Oil and Gas Company met a heavy gas flow in a shallow drill hole. In 1917-1918 the Imperial Oil Company sunk two wells along the Alberta and Great Waterways railways, and the Tapley Syndicate put down a third in the same territory. These tests were made by practical men, but success was not attained, a small show of tarry oil being obtained at depths of about 1000 feet.



America's most northern oil well, the Pelican, Northern Alberta, Canada.



Outline map of Canada, showing the division of the Dominion into two great areas—that to the north of the line drawn on the map being hopeless for oil prospecting. The area to the west and south of this line is rich in oil promise.

These results do not, however, in any way disprove the presence of pay oil in the vast fields to the south of this area which are so far from the outcrops that even the most expert explorer has little data to guide him, and drilling "in the dark" is the only test that can be resorted to.

The first essential, therefore, for the successful discovery of liquid oil accumulations is the location of suitable structures of the oil-bearing sands, and their exploration by drills, those beds distant from the area of outcrop of the Athabasca sands offering better prospects than those in the immediate vicinity, as also do the regions northwest of Edmonton and Athabasca landing where favorable structures which are independent of these tar sand leakages are known to exist.

The Peace River Oil Company, the Tar Island Oil and Gas Company, the Consolidated Oil Fields, Ltd., the Victory Oil Company, and the Northern Pacific Oil Company have all had drills in this region penetrating to depths of from about 1000 ft. to 1300 ft. Their general experience has been the finding of small quantities of heavy tarry oil, and, in an effort to reach the lower Devonian formations, encountering heavy flow of gas or water which must be shut off before further exploration can proceed. This difficulty is, however, purely physical, and the Three Creeks Oil Company is reported to be now installing large pumping units to deal with this obstacle.

In the district around Calgary considerable drilling has been done, and in some cases small flows of from 15 to 30 barrels a day, ranging from very light to heavy oil, have been obtained. Geological opinion is that in this territory the rapid descent of the oil-bearing strata from the faulted and folded areas created by the mountain uplift has placed these strata at so great a depth in this district as to make drilling a doubtful commercial undertaking. Some experts also hold the opinion that the very light finds of oil in the Calgary field are indications that the original source of the oil, the parent reservoir, was at a great distance, and that the oil in its lateral movement has been subjected to so great filtration as to have rendered it an unpromising prospect. New methods of distillation of these light oils may, however, give them an added value and revolutionize opinion in this respect, converting this class of oil into a valuable source of supply of motor fuel spirit.

Examination of the vast districts southeast of Edmonton, lying between the North Saskatchewan and the Belly rivers, has determined that the reported anticlinal folds of the upper cretaceous structure do not exist in central Alberta. The homoclinic structure of this area may be responsible for the difficulty hitherto experienced in locating any large accumulations of petroleum oil, but the area is vast and the absence of anticlines does not disprove the existence of such reservoirs.

It is said that the Imperial Oil Company, the Shell Oil Company and some other interests will spend large sums in drilling in this field during the present year, and the activities of such experienced oil men show how great is their confidence in the promise of this region.

The Amalgamated Oil Company, Ltd., and the Crow's Nest Oil Company are reported to have acquired extensive rights in the Kootenay district, and to be either actively engaged in drilling or preparing to do so, and on the international boundary near Vancouver, a company known as the Boundary Bay Oil Company is reported to have drilled to a depth of more than 700 ft. and to have produced a small flow of oil, while in the same district the Pitt Meadow Oil Wells Company and the Empire Oil and Natural Gas Company have sunk wells, and the Spartan Oil Company has drilled a test hole near Burnaby Lake to a depth of about 2000 ft., at a point where one of the most important oil seepages occurs.

In the Vancouver district, oil and gas seepages have been known for some years past, though their origin has not been demonstrated, but it has been thought that they may indicate oil pools in the sedimentary rocks underlying the Fraser River.

This article would be incomplete without reference to the oil fields of eastern Canada, in fact the Devonian formations of Ontario are at present producing the greater part of the output of the Dominion and have been productive since 1857. In this province the Mosa oil field in Middlesex County is the largest producer and contributed 108,988 barrels in 1918

(*Turn to page 1180*)

Overequipped In Metal Industries

How much money is wasted every year on account of unnecessary machinery that stands idle much of the time?

ARE America's metal industries vastly overequipped? Are they wasting great sums yearly by carrying more capital invested in plants and equipment than is warranted by the consumption of their products?

That such is the case may be inferred from facts presented by W. R. Ingalls in an address at a recent joint meeting of the Mining and Metallurgical Society of America and the American Institute of Mining and Metallurgical Engineers.

The United States has blast furnace capacity to produce annually 48,000,000 tons of pig iron, Mr. Ingalls pointed out, and the steel works have capacity to produce from pig iron, scrap iron, and pure ores ingot steel variously estimated at 52,500,000 to 55,000,000 tons annually. Compared with this capacity is a maximum pre-war production of 31,000,000 tons of pig iron and 30,000,000 tons of ingot steel.

Copper is a more extreme example. The mines produced ores good for 1,250,000,000 pounds of copper in 1913 and reached 2,000,000,000 pounds in 1916. This figure could be attained only in an emergency and could not be maintained for any length of time. The present mining capacity is estimated at from 1500 to 1800 million pounds per annum, or roughly 1,650,000,000 pounds as a fair average estimate. The copper smelteries, not including those of the Lake Superior region, have a capacity for treating 22½ million tons of ore per annum, yet in the year of maximum production, 1916, they treated only 11¼ million tons. This is overbuilding with a vengeance, especially as the 1921 production was less than one-fourth as large as in 1916.

The product of the smelteries must be refined. The electrolytic copper refineries can handle 2,750,000,000 pounds annually, while other refining processes can handle 250,000,000 pounds. The total refining capacity of the country is thus 3,000,000,000 pounds annually, whereas the amount refined in 1916 (the year of maximum production) from the product of domestic and foreign smelteries was only 1,930,000,000 pounds, decreasing to 1,125,000,000 pounds in 1920 and 921,000,000 pounds in 1921. The amount refined in 1913, the last pre-war year, was 1,225,000,000 pounds.

Much of our copper is exported. The chief domestic uses are in copper wire, copper sheet and brass mills, and can absorb 2,000,000,000 pounds of copper per annum, but before the war their consumption was only 800,000,000 pounds. In this industry of copper we find the smelteries at least 100% overbuilt, as based on maximum war production. They probably are 300% overbuilt as based on normal pre-war production. The refineries are from 50% to 220% overbuilt on the same basis, and the copper wire and sheet and brass mills are 150% overbuilt.

The lead smelteries have a capacity of about 900,000 tons of lead per annum. The maximum pre-war production (1913) was 412,000 tons, the maximum war production (1916) 552,000 tons and the 1920 and 1921 productions 511,000 tons and 401,000 tons, respectively. Some of this overbuilding has a plausible excuse. Certain smelteries have become useless due to the running dry of some mines, with consequent failure of the tributary ore supplies of these smelteries. In the manufacture of blue lead products (sheet, pipe, shot and alloys) there is considerable excess capacity even if capacity is estimated on the basis of one shift per day. This already excessive capacity can be practically doubled in case of necessity.

In zinc there is excess in both mining and smelting capacity After discarding some of the war plants there is still good producing capacity for 800,000 tons of zinc per year, whereas the maximum pre-war production was 353,000 tons. The 1920 production was 450,000 tons; in 1921 about 180,000 tons.

Excess mine capacity in the coal-mining industry is notorious and has made that industry a permanent source of infection in our economic structure.

The above figures have not taken into account two factors. The first is that an industry must have a certain excess capacity in order to function easily and to meet peak loads. Furthermore, no plant can function continuously at 100% capacity. On the other hand, temporary overloads can be taken care of. Probably 10% excess capacity will be found sufficient in all cases if a wise policy in planning and scheduling production is adopted. The second is that allowance has not been made for natural increase in consumption capacity due to increase in population and other causes. On the other hand, it is to be noted that in certain cases no growth in consumptive capacity is to be expected, for one result of the war is an apparent decrease in consumptive capacity per unit of population to a lower standard than that which existed before the war for many commodities. Population has increased 11% from the middle of 1913 to the middle of 1922. If these two factors of natural increase in consumptive demand due to growth of population and of excess capacity necessary for peak production and as a margin of safety are fully allowed for, we still have in the industries considered an enormous overbuilding.

Waste from Overequipment

THE waste due to this overequipment is obvious. Carrying charges and rapid deterioration of unused equipment cost heavily. The injury to labor and the community is fully considered in the report. There is another serious result of this overbuilding. The industrial processes we use today are the direct descendants of processes used 10, 50, 100 or 1000 years ago. While there have been epoch-making discoveries and inventions, yet advance in technique, lower cost, improvement in product and increased usefulness to mankind have been chiefly by a process of attrition. At one point we have a larger furnace, or a more durable lining, or a more resistant shell, or automatic conveying of materials, or a purer coke, or the recovery of a valuable by-product, or the use of a cheaper ore, or a 5% better recovery of the chief product, etc., etc. These advances in technology are the life of the industry. In an industry which is not overbuilt, obsolete plants are replaced by plants which have embodied in them the best practice of their predecessors, together with some new refinement, some labor-saving device, some method of obtaining a better or larger or more uniform yield.

A heavily overbuilt industry acts as a check on invention and progress. Plants may be run to destruction because it is cheaper to get what is possible out of them than to keep them at maximum efficiency when there is the certainty that they can operate only on part time or at intervals. Now plants are built only when a special reason such as an epoch-making advance in manufacture is discovered or when an exceptionally favorable geographical position with relation to source of raw materials and market presents itself. Obsolete plants are dismantled and not replaced. Improved technique is not adopted. An industry may thus become stagnant and even pass from one country to another where more favorable conditions exist.



Basic Commodity Prices

(Minimum, at New York, unless otherwise specified)

	Week Ending June 17	Week Ending June 10	Year Ago
Aluminum, pig (ton lots), lb.	.17	.17	.225
Antimony, ordinary, lb.	.0525	.0525	.05125
Brick, Hudson R., per M.	21.00	21.00	15.00
Cement, Portland, bbl.	1.70	1.70	2.15
Copper, Electrolytic, lb.	.1375	.13875	.13125
Cotton, spot, Mid. Upl., lb.	.2265*	.2285*	.1140*
Hides, Chic. Pack., No. 1, lb.	.17	.165	.14
Lead, N. Y., lb.	.0575	.058	.044
Petroleum, cr., at well, bbl.	3.50	3.50	2.50
Pig iron, Bessemer, Pgh., ton.	26.96	26.96	24.96
Pine, roofers 6 in., M. ft.	32.00	32.00	28.00
Rubber, Up River, fine, lb.	.18	.18	.155
Silks, Sinahui, No. 1, lb.	7.25	7.50	6.00
Spelter, N. Y., lb.	.0575	.057	.0475
Steel Billets, Bess., Pgh., ton.	35.00	35.00	37.00
Tin, N. Y., lb.	.31375	.325	.3125
Wool, Dom., ½ blood com., lb.	.50	.48	.30

*Saturday's closing.

Wholesale Commodity Prices

Coal—			
Bit., ¾ in., lump, net ton	4.50	...	...
Anthracite, egg, net ton	...	...	...
Coke, furnace, net ton	6.50	6.50	3.00
Cotton Goods—			
Brown Sheetings, Std. yd.	.12	.12	.095
Standard Prints, yd.	.1025	.1025	.11
Print Cloths, 38½ in., 64x60, yd.	.08375	.0825	.06625
Drugs and Chemicals—			
Alcohol, ethyl, form 5, gal.	.30	.30	.37
Alcohol, wood, 95%, gal.	.57	.57	.85
Alum, lump, lb.	.0375	.0375	.0375
Bleaching Powder, over 34%, 100 lbs.	1.60	1.60	2.15
Borax, crystal, in bbl., lb.	.06	.06	.06
Caustic Soda, 76%, 100 lbs.	3.80	3.75	4.10
Lime, factory, 200-lb. bbl.	1.90	1.90	...
Nitric Acid, 42°, lb.	.065	.065	.0725
Saltpeter, crystal, 100 lbs.	.0775	.0775	...
Soda Ash, 58% light, 100 lbs.	1.80	1.80	2.15
Sulphuric Acid, 60%, 100 lbs.	.50	.50	.60
Flour—			
Spring Pat., 196 lbs.	7.40	7.50	9.00
Winter, soft str't, 100 lbs.	5.75	6.00	7.33
Grains—			
Wheat, No. 2 Red, bu.	1.245	1.315	1.58
Corn, No. 2 Yellow, bu.	.7825	.785	.8275
Oats, No. 3 White, bu.	.44	.47	.475
Rye, No. 2, bu.	1.00	1.055	1.4125
Barley, malting, bu.	.73	.755	.80
Hay, No. 1, 100 lbs.	1.55	1.60	1.33
Straw, lg., rye, No. 2, 100 lbs.	1.80	1.75	1.20
Hides—			
Cows, heavy native, lb.	.1375	.1375	.10
Country, No. 1 steers, lb.	.12	.10	.09
Iron and Steel—			
Basic, Valley furnace, ton	25.00	25.00	21.00
Steel bars, Pittsburgh, 100 lbs.	1.70	1.70	2.10
Beams, Pittsburgh, 100 lbs.	1.60	1.60	2.20
Galvanized Sheets, No. 28, Pittsburgh, 100 lbs.	4.15	3.15	5.00
Leather—			
Hemlock, sole, No. 1, lb.	.20	.20	.28
Scoured oak backs, No. 1, lb.	.45	.45	.55
Lumber—			
FAS Qtd. Wh. Oak, 4/4" M. ft.	145.00	145.00	145.00
Tonawanda Wh. Pine No. 1 barn 1x4", M. ft.	82.00	82.00	90.00
Adirondack Spruce, 2x4", M. ft.	38.00	38.00	48.00
No. 1 Com. Y. Pine Bds., 1x4", M. ft.	44.75	44.75	37.00
Oils—			
Coconut, spot N. Y., lb.	.0875	.09	.1125
Crude, tks, f.o.b. coast, lb.	.07	.07125	.08
China Wood, bbls., spot, lb.	.1375	.13	.15
Cottonseed, lb.	.1225	.1225	.074
Linseed, city, raw, gal.	.88	.87	.79
Paraffine wax, ref., 125 m. p., lb.	.035	.035	.04
Turpentine, gal.	1.03	.96	.62
Paints—			
White Lead, in oil, lb.	.125	.125	.13
White Lead, dry, lb.	.0725	.0725	.075
Zinc., Amer., lb.	.075	.075	.0875
Paper—			
News roll, 100 lbs.	3.50	3.50	4.25
Book SS. & C., lb.	.0625	.0625	.0775
Wood Pulp, ton	75.00	75.00	100.00
Sugar—			
Cent. 96°, 100 lbs.	4.48	4.48	4.00
Fine Gran., in bbls., 100 lbs.	6.00	5.70	5.75
Wool—			
Boston Aver. 98 quot., lb.	.7347	.7221	.4099
Stand. Clay Wor., 16-oz., yd.	3.725	3.705	2.85
Fancy Cassimere, 13-oz., yd.	2.45	2.40	2.125
Serge, 36", Wor., yd.	.52	.50	.52
Broadcloth, 54", yd.	2.75	2.75	2.50
Cottonwarp serge, 36", yd.	.45	.45	.45

Financial

Bank Clearings	Week Ending June 17	Week Ending June 10	Year Ago
New York	$4,783,552,833	$4,158,592,089	$4,206,894,343
Chicago	594,210,994	552,750,212	498,434,900
Entire Country	8,373,000,000	7,464,000,000	7,490,000,000
Increase or Decr. (Per cent of total from preceding year)	+11.8%	+12.8%	—21.2%

Cost of Money—New York	Week End. June 17	Week End. June 10	Year to Date	Year Ago
Call Loans	4@2¾	4¾@3	6@2¾	6@5½
Time Loans (60-90 days)	4¼@4	4¼@4	5@4	6½
Six Months	4¼@4	4¼@4¼	5@4¼	7
Com. Discount, 4-6 mos	4¾@4¼	4¾@4¼	5@4¼	6¾@6½

Financial Transactions	Week Ending June 17	Week Ending June 10	Year Ago
Stock Sales, shares	6,486,477	5,822,689	4,562,744
Aver. Price, 25 Railroads	61.39 h. 59.25 l.	63.21 h. 61.10 l.	51.45 h. 50.37 l.
Aver. Price, 25 Industrials	96.15 h. 92.40 l.	99.13 h. 95.86 l.	77.31 h. 72.54 l.
Sales of Bonds, Par Value	$82,704,100	$83,321,280	$64,534,165
Aver. Price, 40 Bonds	79.81 h. 79.53 l.	80.05 h. 79.84 l.	67.90 h. 67.69 l.
Average Net Yield, 10 High-Grade Bonds	4.615%	4.622%	5.502%
New Security Issues	$61,771,000	$27,360,000	$17,100,000

Business Failures	Week End. June 17	Week End. June 10	Year Ago
Number	407	440	329
	May, 1922	Five Months	May, 1922
Liabilities	$44,402,886	$335,473,888	$57,066,471

Industrial

Building Permits	May, 1922	April, 1922	May, 1921
	$184,414,135*	$192,184,353†	$109,737,709‡

*135 cities. †142 cities. ‡136 cities.

	May 15, 1922	April 29, 1922	April 8, 1922
Idle Freight Cars Number	518,758	540,046	419,267
	June 3, 1922	May 27, 1922	April 22, 1922
Car Loadings Number	750,645	821,121	714,088
	May 31, 1922	April 30, 1922	May 31, 1921
Steel and Iron Barometer			
U. S. Steel Orders (tons)	5,254,228	5,096,917	5,482,487
Daily Pig Iron (Prod.) tons	74,409	69,070	39,394
Monthly Pig Iron (Prod.) tons	2,306,675*	2,072,114†	1,221,221*

*Month of May. †Month of April.

Foreign Trade	May, 1922	April, 1922	May, 1921
Exports	$308,000,000	$318,100,447	$329,709,579
Imports	254,000,000	217,025,082	204,911,186

Structural Steel Awards—Total sales for May, 146,900 tons, at the rate of 92% of capacity.



Speculators Raid New York Exchange

PRICES of listed stocks on the New York Stock Exchange wavered uncertainly in the early part of June, and then began to slip downward. On June 12 they executed a sharp and severe dip, and on the very next day recovered.

These antics did not alter the general opinion that we are still in a rising stock market. All shades of sentiment are to be found in Wall Street, of course, but the consensus of opinion is that whatever reactions now take place are merely technical and temporary. Some people who believe in the bull market suspect, nevertheless, that there will be another drop before the steady rise is resumed; but this, of course, is more guesswork. There are others who foresee a general decline in business, accompanied by a drop in speculative securities; but these prophets are very few. Most observers point to the continued optimistic reports from industrial and commercial circles and to the increasing ease in money rates as evidence that further increases in stock prices are due.

The average price of 50 stocks dropped two points on June 12. This was the severest decline recorded since that of June 20, 1920, when the loss was 2.06, according to the *New York Times*. As compared with 81.80, the high record for 1922, the average at the close of trading on June 12 showed a decline of 5.08 points. The drop in stocks was accompanied by a similar break in wheat and cotton, and on the following day all three markets recovered at the same time.

Wall Street ascribed the break to various causes. Some thought it was due to the fact that Europeans had been heavy speculators in the American markets, and sold their holdings when the news was made public that negotiations for a loan to Germany had failed. Others reasoned that the exposure of the inside deal in the three-company steel merger caused the drop. Still others said it was due to the operations of professional speculators who had tried in vain to drive their favorites up in the preceding days, and who finally decided that the only thing to do was to drive prices down and start again from a new level. The prompt recovery on the day after the break pointed clearly to the operations of professional speculators, who promptly covered their sales at the lower prices.

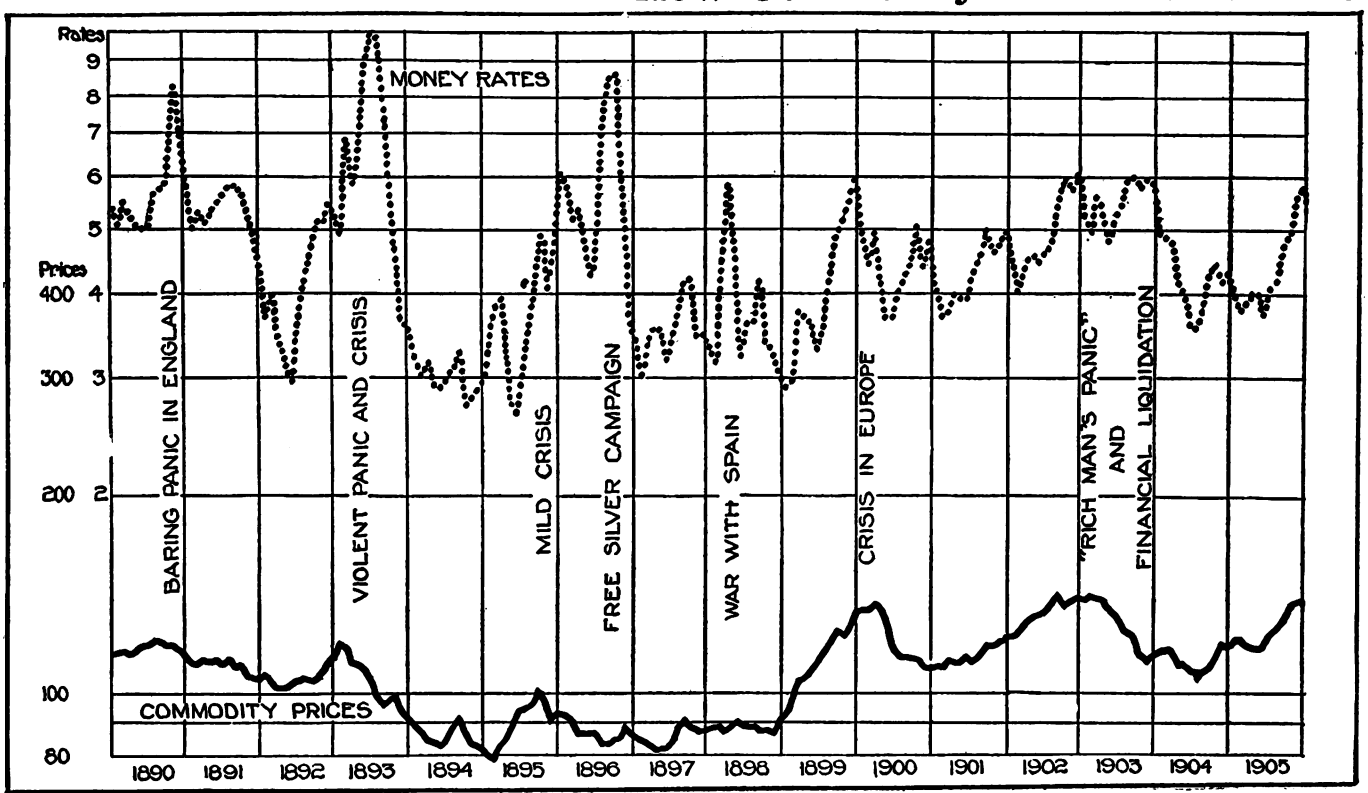
Bond Market Holds Firm

THE bond market, although somewhat irregular, did not follow the declines in stocks. Trading was dull, but prices were firm. Liberty bonds especially were strong, and high-class corporation issues showed no weakness. Offerings of new issues continued to be lighter than they were earlier in the year.

Callable Bonds Redeemed

CALLABLE bonds are being redeemed in increasingly large quantities. More than $28,000,000 of these securities

How Commodity Price Fluctuations



The commodities are: cottonseed oil, coke, pig iron, bar iron, pig zinc, mess pork, hides, print cloths, sheetings, and worsted yarns. The prices of these commodities all have similar major fluctuations.

In these charts the logarithmic or ratio scale is used. Consequently, equal percentage changes in each series are represented by equal vertical distances and the differences in the violence of fluctuations of the two curves corresponds exactly to the differences in percentage changes from minima to maxima in the two series.

The business cycle is clearly revealed over a period of years by the wave-like variations in the industrial, commercial, and financial statistics which ordinarily serve as a basis for judgments concerning the fundamental speculative, business, and banking situation.

were called for redemption during June, the *New York Evening Post* points out. This follows the calling of slightly more than $26,000,000 in May; and the amount scheduled for redemption in July is said to be substantial.

"The fact that only about $4,500,000 were called in June of last year is a sufficient commentary on the change in money market conditions which has taken place since that time," says the newspaper. "These facts are full of significance for the investor who still includes among his holdings high coupon rate bonds which contain a clause allowing the issuing corporation the privilege of calling them prior to maturity. There is some division of opinion as to whether money rates will continue to sink during the next few months, but nowhere is the opinion held that any substantial advance in rates is yet in sight. Should rates merely cling to their present levels for a few months longer, it is certain that almost every issue of this character is coupled with a provision allowing the issuing company such an option. Should rates work to lower levels, the investor whose bonds have been called will be faced with the necessity of reinvesting his capital in securities which will give him a considerably reduced income, or else of sacrificing his factor of safety to obtain the yield of his former holdings."

Rail Stocks' Future Excellent

OWNERS of railway securities have been encouraged to expect an increase in the value of their holdings by the month-to-month growth of railway earnings. A railroad official with a reputation for conservative statement estimates that the operating income of the first-class roads for May was about $60,000,000, compared with slightly more than $50,000,000 in April.

Basing his judgment on current car loadings, this official estimates that June net operating incomes will total $65,000,000. On these estimates net income for the first six months of the year will approximate $333,000,000. The same official predicted earnings of $755,000,000 for the full year 1922. In order to earn 5¾% on invested capital the roads would have to show net operating income of $1,042,032,500.

The Central Pacific Mixup

WHEN the Supreme Court ordered the Southern Pacific to relinquish control of the Central Pacific it started a discussion of considerable proportions. No one now knows just what will happen to the Central Pacific. The Union Pacific Railroad wants the liberated line to be operated independently if it is not permitted to combine with Union Pacific. William Sproule, president of the Southern Pacific system, on the other hand, has pointed out that Central Pacific naturally belongs to his road, and intimated that legislation will be asked overriding the Supreme Court decision.

Fleecing the Public by Radio

THE stock swindler follows the trend of the public interest. Once his most profitable field of operation was oil; now it is radio.

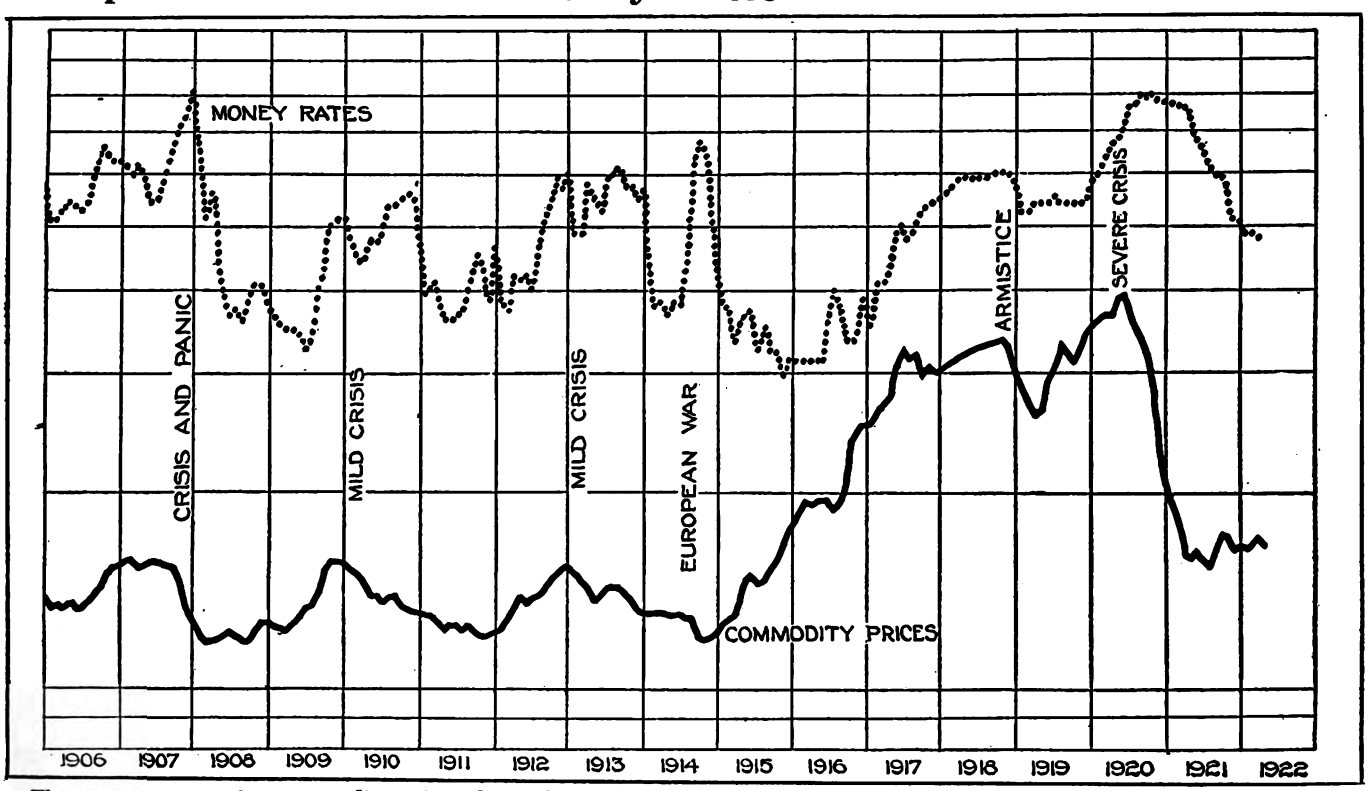
"The radio situation is well on the way to parallel the oil boom, and in the wake of enthusiasm unscrupulous promoters are relieving small investors of their savings," says a statement by Alexander Eiseman, president of the National Radio Chamber of Commerce.

"It is estimated that in the last three months at least 1,250 new corporations have been organized to manufacture radio apparatus. Obviously, all of these cannot have technical skill or requisite standards. In all this mass of ignorance, many must fail. Shoemakers, jewelers, hairdressers, cloak and suit manufacturers, are stampeding into the radio business.

"In addition to the basic engineering and financing problems there are always the manufacturing and marketing problems which must be solved before investments can pay back one penny on principal.

"Investigations have brought out the fact that at least thirty-seven radio apparatus manufacturers at present are infringing upon each others' patents, and at least 1000 other manufacturers are infringing upon patents of several older radio concerns.

Compare With Those of Money Rates



The curve representing commodity prices shows the average wholesale price of ten commodities selected because, first, they are unusually sensitive to price changes and are not greatly affected by the seasons, and, second, they are of a varied nature and are important to the industrial life of the country. The curve representing rates on commercial paper shows the rate on 60-90 day commercial paper in New York. These series reflect very clearly variations in business prosperity, and the most noticeable feature of the curves is their cyclical movement.

A second noticeable feature of the chart is the correspondence of the major wave movements of the two curves. Comparison of these movements shows, however, that the crests of the waves for interest rates appear to follow, in point of time, the high points for commodity prices.

(By Warren M. Parsons for the *Harvard Economic Service*)



Measuring Management Efficiency

ADDRESSING the *Society of Industrial Engineers,* at its national convention, President J. W. Roe asserted that industrial engineering can best serve industry by formulating a standardized method of measuring the efficiency of management. As a standard of 100% management, the following elements were presented. Perfect management would:

1. Purchase the right materials, of right quality, in the right amounts, the lowest available prices; 2, secure delivery in the shortest practicable time, at the least expense, and always have all material on hand, where, when and in the condition wanted; 3, process 100% of the material through the plant in the least possible time, by the best suited processes, equipment and methods; 4, utilize the full capacity of 100% of the equipment all the time; 5, utilize the full capacity of 100% of the labor hours paid for with the least cost of supervision and general overhead consistent with perfect functioning, and with the least *total* labor cost, direct and indirect, consistent with sound social and economic conditions; 6, produce goods 100% of which will pass all inspections; 7, keep 100% of all delivery promises, except for causes beyond the control of the management; 8, market 100% of all goods at the least total selling cost, at the best obtainable prices, to customers who pay their bills without delay; 9, would, finally, set up and maintain adequate reserves for depreciation, business depression, provision for growth, etc.

Principles of Management

A MASTER guide for the executive who is studying his organization, whether factory or office, is given in the eight fundamentals of management outlined by H. W. Leffingwell. These principles of management are:

1. *Define your purpose*—you must know *what* is to be done before you can know *how.* This is your master task. 2. *Analyze your problem*—your master task will then break up into many detail tasks. Consider them all—neglect none. 3. *Seek the facts*—study every condition governing each task, find the undesirable elements to be eliminated, the desirable elements to be retained. Then standardize right conditions. 4. *Devise the one best method*—aim to conserve *energy—time—space—material.* Determine relation of details to master task. 5. *Find the person best fitted*—for each task certain personal qualities are essential. In each person certain qualities predominate. Find the person best fitted. 6. *Teach the person best fitted the one best method*—not by driving, but by thorough, patient teaching are understanding and skill developed. 7. *Plan carefully*—right planning of arrangement and sequence of work will enable you to accomplish tasks in *logical order—accurately—quickly—economically.* 8. *Win co-operation*—co-operation means working together. It cannot be demanded. It must be won. Accept your share of the responsibility. Respect the rights and aspirations of others.

Cure for Selling Troubles

THE cure for 90% of selling troubles is in the factory, asserts E. L. Wayman in *Factory.* The product which fills a need at a price which the customer is willing and able to pay very nearly sells itself. To reduce prices to the customers' buying power necessitates the reduction of costs to a minimum. It is a common fault for a concern whose general profits are satisfactory and which manufactures a varied line of products to overlook the fact that it may be losing money on some articles and making relatively high profits on others. Prices based on inaccurate costs tend to encourage business on the unprofitable articles and discourage business on the profitable articles, with the result that average profits are lower than they should be.

A profit and loss statement by lines monthly gives a control of stock—raw, in process and finished—so that any lack of balance between the three can be detected quickly and rectified. Without a proper balance of inventories, production may be interfered with, large sums of needed capital may be tied up and customers offended by tardy shipments. There is one best proportion for these three kinds of stock and, once determined for a particular business, any deviation indicates that something is wrong.

A feature of the cost system is a departmental analysis sheet which shows each item of overhead expense for the current month, the preceding month, the current period and the same period of the previous year. Taken with the statement of activity of each department as indicated by the productive hours of labor put in, these expense analyses give a close control of the efficiency of each department.

Another step in cost cutting is the study of the arrangement of departments and machines. If a premium or bonus plan is to be put in operation, it is especially vital that equipment should be in the best condition and operations simplified so that standard unit times will be set as low as possible.

Square Peg in Square Hole

HOW to fit the right worker in the right place is explained by Donald E. Rowe in *Industrial Management.* Four major steps are given: (1) determination of the elements to be gone into for each job and the analysis of the various jobs throughout the plant; (2) determination as to just what constitutes the vital elements of the job and the imporant points to be observed in the type of worker required—such specifications should then be recorded in some usable form; (3) grouping all jobs into classes of a similar worth to the company and establishment of rates of pay for these different classes; (4) assignment of the worker to the proper job and job class. Also the rearrangement, where necessary and practical, of the worker's rate of pay.

In attempting this job analysis information must be secured from two angles: (1) the job or work itself, and (2) the type of worker required for the job. The points to be considered in regard to the job itself are (1) number of people on this type of work at present, segregated as to male and female; (2) previous experience required for work; (3) whether male or female workers are most efficient; (4) age at which worker can start work; (5) time required to learn the job; (6) facts as to whether job is clean, dirty, wet, dry, dusty, etc.; (7) whether work is of a repetitive or varied nature; (8) present rates of pay.

The essential points as to the type of worker desired are: (1) male or female; (2) past experience required; (3) education required; (4) best age to start; (5) length of time required to attain average ability; (6) length of time before becoming efficient; (7) a quick or phlegmatic type of worker required.

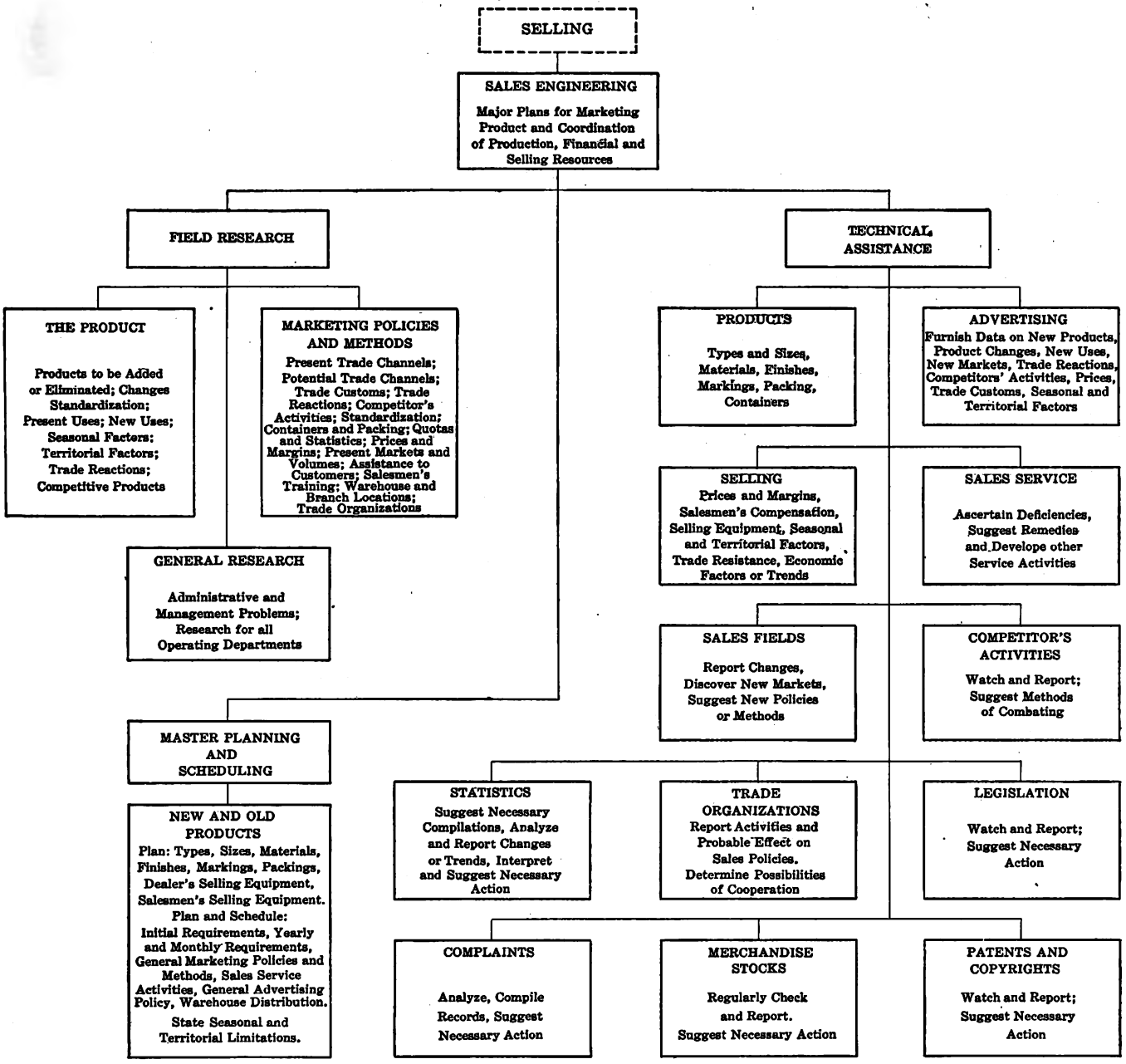
Predetermined Costs

THE advantages of standard costs and the predetermination of costs are recognized in many large industrial concerns, but little has been done to make these advantages available to the medium- and small-sized factory. G. Carter Harrison, writing in *Management Engineering,* offers working plans for standard costs in the first of a series of articles written for the small plant.

A suitable cost system should contain monthly profit and

FUNCTIONAL ORGANIZATION OF A MANUFACTURING PLANT

V SELLING DEPARTMENT (1)



Functions of a Typical Industrial Plant

This chart is fifth in a series based on lectures given at the Bureau of Personnel Administration by Warren D. Bruner.

loss data showing profit and loss realized on the sales for each month analyzed by lines of product, or according to some classification suitable to the character of the business. It should also be possible to obtain prompt and accurate information relative to the cost of manufacturing any standard article under the conditions existing today, that is, current cost data. Predetermined cost data indicating what an article should cost if materials are purchased at certain prices and the factory operated at a certain capacity should be available.

A properly designed cost system does away with the expense of elapsed time clocks and the waste of time of shop operators and clerks expended in furnishing the accounting department with entirely unnecessary information as to the time spent on individual operations.

Data relative to operating efficiencies should be built up on the assumption that the executive is not interested so much in what things are right as in the things which are not going smoothly. A mere statement of the actual cost of each operation in comparison with the standard cost is of limited value. The information should be so expressed that the executive can see the weak spots in the organization.

A summarized operating efficiency statement, showing actual expenses for the month compared with standard expenses, gives a bird's-eye view of the situation. Items are classified as those beyond the control of the management and those within the control of the management. A saving in cost compared to the standard is shown in black and an increase in red.

The machine rate method is the most accurate system of distributing factory burden or overhead. Under this plan each machine is regarded as a manufacturing unit and is treated as if it were a separate factory, paying rent for the space it occupies and being charged for the use of power and for its share of the indirect expenses of the factory.



A MILLION AND A QUARTER railway employees have had their wages reduced by the sum of $134,988,919 annually by the orders of the Railway Labor Board. That this cut is unjust and unnecessary and that, therefore, the hearty support of union labor the country over should be accorded the rail unions in their fight to have the reductions removed or lessened was the unanimous opinion of the American Federation of Labor in convention at Cincinnati last week. Prior to the announcement of the third wage cut of $26,500,000 in the pay of 325,000 rail workers in the clerical and station forces, President Gompers stated that if the wage reductions became effective there would be nothing left for the railway workers to do except to strike. And B. M. Jewell, president of the Railway Employees Department, said: "The railway employees of this country are convinced that certain sinister interests have for some two and one-half years, if not longer, been endeavoring to maneuver railway employees, or at least certain of them, into a position where there might be a hope of crushing those organizations."

The Labor Board, however, maintains that its desire is to be just to all the parties concerned—to establish wages that will be fair to the employees, prove satisfactory to the carriers and impose no unnecessary burdens upon the public.

"In order to get the facts of the railroad wage cut straight," says *The Annalist,* "it is necessary to refer again to the often-quoted elements which the Transportation Act says shall be taken into consideration by the board in determining wage rates. . . . The first one . . . is this: The scale of wages paid for similar kinds of work in other industries.

"It is a curious and interesting fact that the only statistics before the board in regard to wages in other industries were certain very elaborate reports gathered and presented by the railroads, especially those of the Eastern territory (east of the Mississippi and north of the Ohio). The men of the railroad shop crafts are organized in several international unions, which include the workers of each craft both in the railroad shops and in industries outside of the railroads. The International Association of Machinists, to mention one of the strongest and best organized . . . had unrivaled facilities for collecting and presenting to the Labor Board statistics of the rates of wages paid to machinists in outside industries. But it did not present such an array of wage statistics. And this remarkable abstention was duplicated by each of the other highly organized crafts involved in last week's decision."

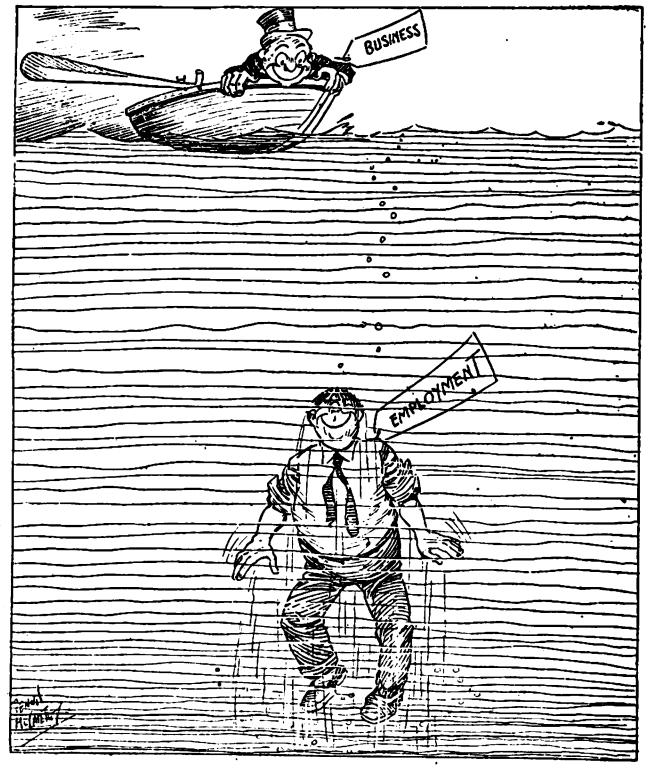
That no attempt was made to produce figures showing that outside wages proved the injustice of the wage cut appears to indicate that the actual facts of outside wage rates did not justify the retention of the existing rail rates.

It is pointed out that the Labor Board was governed by the provisions of the Transportation Act, and that uncontradicted wage-rate evidence presented by the railroads appeared to justify the reductions ordered by the board for the shop crafts.

But that the Federation is preparing to resist not only present wage cuts but future wage reductions is indicated by the effort that is being made to add to the ranks of organized labor. Authorization has been given to the three following campaigns: (1) A campaign to unionize workers throughout the country employed in public schools, theatres, apartment and office buildings, such as janitors and elevator men, window washers, etc., into the Building Service International Union. (2) A campaign to organize the 2,000,000 "white collar" or office workers of the United States and Canada. (3) A campaign for complete organization of telephone operators. Other subjects to be considered are: court injunction in labor troubles; opposition to all forms of compulsory arbitration and Industrial Relations Courts, especially the Kansas law; advancement of the co-operative society movement to defeat the high cost of living; unemployment and remedial legislation; affiliation with the International Federation of Trades Unions, representing organized labor of Europe; armament limitations and its effect on labor; old age pensions; legislative attacks on labor. The establishment of a chain of newspapers is also to receive consideration.

Students of the trend of affairs at the convention assert that the policies finally adopted by the Federation may be very different from those adopted in other years. It must be remembered that the most strongly established organizations of wage-earners (the rail unions) have had reductions in their wages, and that resentment over this may drive the union's main organization to a more radical course than it would normally pursue. Although a strong element in the Federation has maintained a conservative policy, a rival element insists that only a sharp and daring change of course can save the union's cause.

But, although the wage reduction is certain to be bitterly protested by labor leaders, a lengthy railroad strike does not seem probable. Not only is the public out of sympathy with strikes, but it feels that in view of the lowered living costs and the need of the railroads for lower operating costs, the wage reduction is a logical step in promoting the



(New Orleans Times-Picayune)
"Coming up at last."

revival of business. The possibility of Government injunctions against a rail strike is also likely to have a restraining influence. Even should the strike be called, it is regarded as almost certain that it would be of short duration.

The Coronado Decision

ALTHOUGH the recent decision in the Coronado coal case has been bitterly denounced by labor leaders as a blow at organized labor, it is the opinion of Ellis Searles, the editor of the organ of the United Mine Workers of America, that this ruling is perhaps the most important and far-reaching court decision ever rendered in a labor case by a court in this country. It is pointed out that under this ruling a labor union now has the same legal right to sue an employer for damages for violation of a working or wage agreement that the employer has to sue a labor union. Also, that a labor union now has the same legal right to obtain an injunction against an employer that the employer has for one against a union. It is asserted that the decision of the Supreme Court in the Coronado case opens the way for labor unions to go into the courts for protection.

"Until the Supreme Court decided the Coronado case," says the editorial, "labor unions did not know they could also sue for damages. But if the Coronado decision is good for one party it must be held good for the other party.

"If a labor union can be sued, as was decided by the United States Supreme Court in the Coronado case, then it can also sue. If a labor union can sue, then there is no good reason why it should not utilize the law and the courts for the protection of itself, its members and their welfare against oppression, damage or outrage.

"The decision says a labor union may be sued for damages to property growing out of a strike. But there are limitations and restrictions to that rule. . . . For instance, the decision says that an international union cannot be held for damages in a local strike that was not called, authorized or ratified by the international. Employers have all along contended that the international was responsible for every act of every member and they have been supported in that position in many courts. . . . A union can now be held for those things for which it is directly responsible, but nothing more. If a strike is conducted along peaceful lines and without violence or lawlessness, as all strikes should be conducted, there will be no grounds for damage suits."

A different view of the matter is taken by Samuel Untermyer. In a recent letter to State Senator Charles C. Lockwood, New York, chairman of the Legislative Investigating Committee, he says that although incorporation would undoubtedly prove helpful to the unions in protecting its members against personal liability, there is another form of regulation which would not interfere with the right to strike or with any other substantial right of the unions—the regulation and supervision of labor unions by a State agency. He believes that labor unions should be required to take out a license and in order to do so its constitution, by-laws, rules, regulations and practices should be subject to the approval of the licensing power. He points out that the practices at which the regulation and supervision would be aimed are in many cases as oppressive against the members of the unions as they are against the public, and that unless the power to eliminate them is lodged in some governmental authority, organized labor will eventually be driven to its own destruction.

The Amalgamated Convention

"THE convention of the Amalgamated Clothing Workers, which opened in Chicago a week later than that of the International, differed somewhat from the latter in its attitude on amalgamation and political action," says *Labor Age*. But although the convention did not give its support to any political party, it, however, did instruct the Executive Board to make a survey of working-class political parties, report its findings and recommendations to its membership and take a referendum vote if it should discover a political movement representing the ideals of the membership. The next big industrial objective of the Amalgamated, it was decided, would be the establishment of an unemployment fund out of the proceeds of the industry. The officers were instructed to make this question an issue in all future negotiations with employers. An industry must be obligated, the delegates declared, to maintain its workers.

An indication of the thoroughness of the organization of this body of workers is indicated by the approval given by the convention to the establishment of the Amalgamated Trust and Savings Bank of Chicago, with a capital stock—almost completely subscribed—of $200,000.

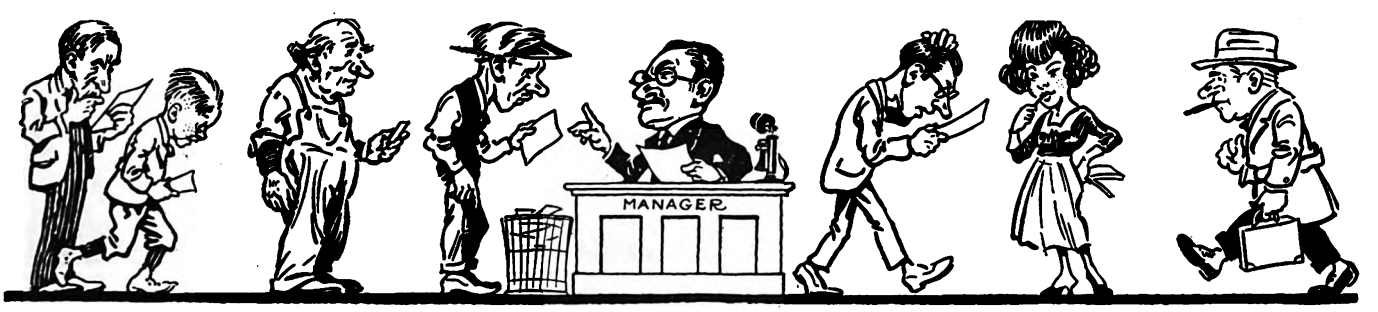
Labor's New Platform

DESPITE a hard fight among the delegates to the convention of the American Federation of Labor at Cincinnati, the convention defeated an attempt to force the Federation to go on record for free immigration. The A. F. of L. has consistently supported restricted immigration since 1892, and this year instructed the Executive Council to watch the situation closely and protect American workmen against cheap foreign labor. The convention also went on record opposing the sales tax plan, continuing its efforts to bring about an alliance with agricultural bodies, voting moral and financial support to the striking textile workers in New England, and to striking printers, denouncing employers' organizations as combinations in violation of the Sherman Anti-Trust law. Other resolutions called upon organized labor in every State to start a campaign to have a law similar to Ohio's compensation law adopted in all States, for opposition to the Elkins' bill providing for refunding fines levied upon convicted violators of the Food Control or Lever acts, and the staging of a mass meeting in Newport in support of the strike waged by the Iron, Steel and Tin Workers at the Newport Rolling Mills.

Labor Board Answers Ultimatum

ACCEPTANCE of the $135,000,000 wage cuts on July 1 will be urged upon railroad workers by the United States Railroad Labor Board in a reply to the "ultimatum" of June 18 from the union chiefs at Cincinnati to the effect that if the workers vote for a strike the leaders will sanction it.

The answer of the board, which is being prepared by Chairman Ben W. Hooper, will go into phases of the readjustment period, such as railroad wages and their relation to transportation costs and to industry and production in general.



(From Trained Men)



WHEN the international bankers' committee adjourned its sessions without agreeing on a loan for Germany, J. P. Morgan, the American representative, announced that the disagreement was largely the result of the attitude taken by France in regard to the reparations. Three plans were presented by the German, Belgium and French representatives. The main points of the French plan were to divide the 132,000,000 gold marks due from Germany into parts, leaving 82,000,000 marks in "C" bonds for the present issue and the remaining 50,000,000 marks in corresponding "A" and "B" bonds in instalments spread over a period of 10 to 12 years. But, according to Mr. Morgan, the placing of even half such a sum, was possible only if France agreed to a reduction in the German debt and repudiation of all idea of recourse to penalties. This the French steadfastly refuse to do; they have, apparently, adopted the non-compromising policy of all or nothing, which makes it impossible for American bankers to assist in floating the loan.

The effect of the rejection of the loan on export trade is twofold. First, a more unfavorable foreign exchange will probably result, and second, there are likely to be fewer purchases of American goods by European buyers. French and Belgian exchange is hardly in the most favorable condition for an increase in exports. Although the English pound has gained 10%, it is still worth less than in normal times. And the extent to which the German mark has fallen has made it impossible to conduct German industry or trade on anything but a speculative basis. It was hoped that the loan would enable Germany to balance her budget and put an end to the reckless printing of paper marks.

High Tariff Adds to Exporters' Troubles

IN addition to the unfavorable rate of exchange, the proposed high tariff adds to the difficulties confronting the exporter. Although Secretary of State Hughes has announced that the tariff is "only a domestic matter," Ambassador Ricci of Italy and Ambassador Geddes of England have strongly objected to this view. All of which indicates the interest taken by European countries in our tariff rates. It is believed that counter tariffs may be imposed by the countries affected and that these restrictions may injure our export trade.

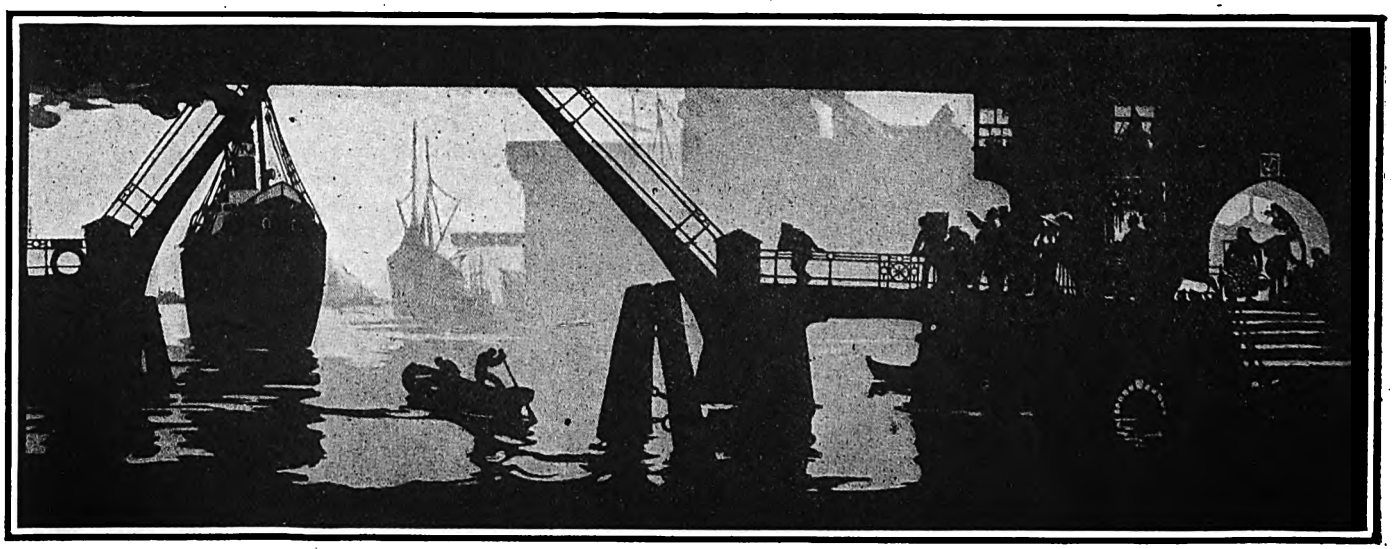
There are, however, several encouraging factors to be taken into consideration. With a steady rise in commodity prices here, manufacturers will more frequently seek export outlets for production, in order to keep prices on the upward trend. After July 1 manufacturers and exporters who enter foreign markets will be aided by a new force of Government trade experts that will be sent throughout the world to develop existing fields.

Foreign trade figures for the month of April show that exports from the United States maintained the same daily average as in March, when they were the largest for any month since October. According to the *American Exporter,* iron, steel, copper and other non-ferrous metals, building materials, cotton, wool, provisions and agricultural commodities are among those which have made advances. During the month of May foreign trade has not only continued the improvement shown in the past few months, but has made further advances. Demands for raw materials and prices have either taken an upward turn or continued a definite upward trend previously started.

April automotive exports showed an increase of 14.7% in value over those of the previous month, further extending the upward curve that started in February. Passenger cars gained 44% in number and 25.8% in value, while motor trucks increased 49% in number and 21% in value. The unit value of passenger cars exported decreased $107 and that of motor trucks decreased $263. Parts of cars showed an increase of 9%.

The increase in the volume of exports of crude oil, gasoline and kerosene, which were noted in March, continued during April, the percentage of increase for April over the previous month being 15% for crude petroleum, 10% for gasoline and naphthas, and 14% for kerosene. The movement for the month in these products was substantially greater than for April, 1921, the increase being 23.6% for crude oil, 2% for gasoline and naphthas, and 52% for kerosene. Exports of gas and fuel oil showed a sharp decline of some 20,000,000 gallons under shipments for April a year ago.

A marked increase of Southern yellow pine exports for the month of April, as compared with those of the previous 18 months, indicates a revival of the export trade in lumber.



"At the Pier," a type of attractive illustration found in pages of new German industrial publications.



Eliminating Waste in Selling

THE desirability of having salesmen know the cost of each call in order to reduce traveling expense and increase sales is discussed by Roland Cole in *Printers' Ink Monthly* for June. One method whereby a salesman may visualize the importance of planning his work in advance has been adopted by the Lowe Brothers Company. This plan consists in having a large map made of each salesman's territory.

In making the map the names of the State, counties and towns were not placed upon it, but the counties were indicated by letter, A, B, C, etc., the towns by numbers, numbering them according to the order in which they were called on, commencing with the first of the year.

Towns where agencies were located were indicated by a red ring, towns where the salesman still had reason to believe he could land an agency because of work done during the fiscal year were indicated by a green ring; towns where the salesman called and endeavored to establish new business, or where he did not believe there was an opportunity to secure new business, were indicated by an "X" mark. In ink beside each town were indicated the purchases of the dealer-agent in dollars and cents.

Starting on the first day of the year, a string was tied to a nail driven in the location of the salesmen's home town. This red string was stretched to a nail driven in the first town made by that salesman; twisted around this nail once, it was carried on to the second town, the third, fourth, fifth and sixth, and back to the salesman's home town, where he spent Sunday. Starting with the next week, a different colored string was tied to the red string at the home point, and his week's travels were indicated by winding this string on the nails driven in the towns which he made that week. This process was repeated week after week with different color string, until the map showed clearly the salesman's travels for the entire year.

In presenting this to the sales force, these strings were wound on the map backward; the last town made in the year was wound on as the first town. This was done to save time, because in showing this map to the sales force a great saving could be made by having the map first strung and then unwinding the strings on the map in the order in which the towns were actually made.

By the side of each town was marked the number of calls made during the year, and below, the total expense of these calls arrived at by multiplying the number of calls by the cost per call.

Among the points brought out were the following: One agent called on once bought not one dollar's worth of merchandise from the company during the entire year. A town in which no sales were made had been visited seven times at an expense of $131. One pet account was called on 52 times at a selling expense greatly in excess of the profits made on the account. One so-called agency was called on once, the sales for the year amounting to $18.20, the cost of the call amounting to $18.70. An agency buying $1850 was called on once; another buying $208 was not called on at all.

By presenting this plan to the men at the annual convention, the danger of making any salesman feel that he was being singled out for criticism was avoided. Nor could the men as a whole feel that the subject was brought forward for consideration as an economy measure for the company. On the other hand, every man looked upon it as an efficiency movement fraught with as much good for the man as for the company, inasmuch as it meant increased earnings and increased business.



An automobile advertisement in the German *Illustrirte Zeitung* illustrates not only the use of black and white at which the Germans are adept, but the strong effects that can be secured through simple geometric elements.

Valuation for House-Organ Subscriptions

A NOVEL method of securing interested readers for house-organs is described in *Advertising and Selling*. A value of one dollar was placed on a year's subscription. A cut was made to look like a check with the amount one dollar written in and signed by the company. The "pay to" part was left blank.

These checks were sent out to everybody on the list accompanied by a letter selling the house-organ and offering to send it to those who endorsed and returned the check. Of course the check carried a line stating it was only good in payment for a year's subscription to the house-organ.

The Slump in Germany

A GENERAL slump in business and economic conditions is noticeable at present in Germany. The production of several of the most important commodities has decreased, and on account of the overpurchasing which has been going on for some time, business is dull in the domestic market. Germany's foreign trade, also, shows the same unfavorable balance which characterized its commerce until December of last year. Industry appears to be hampered chiefly by lack of coal and raw materials and by wage advances.

AUTOMOTIVE

The Need for Automotive Research

THE increasing importance of research in the automotive industry is emphasized in a special research number issued by *Automotive Industries*. The most important problems covered are those dealing with fuel, highway transportation, aircraft, combustion, engine development, the employment of iron and steel, metals and wood products, and the effect of market research in the passenger-car field, in the sale of motor trucks, and in the development of tractor design.

It is pointed out that the necessity for research in all the departments of the automotive industry at this time is, first, because of the greater demand from the public for more value per dollar expended. The manufacturer is now faced with the problem of not only giving a better vehicle, if he is to build for the future, but also one at a fair price. The second reason why research is so essential is that the great problem of production which absorbed the activities of manufacturers from 1912 until 1920 is no longer a major consideration. Today the manufacturer is not so much concerned with the problem of how to build more, or in greater numbers, as on how to build better and lower the manufacturing costs as well as the marketing and maintenance cost in every possible way.

Selection of Steels for Automobiles. Metallurgist tells how important it is to select proper steel, and then to treat it properly so as to bring out the desired qualities. Numerous steel analyses are presented, and the advantages or disadvantages of each are discussed. Importance of ductility is emphasized. W. E. JOMINY, *Automotive Manufacturer*, 4-22, 4000 w. MAH.

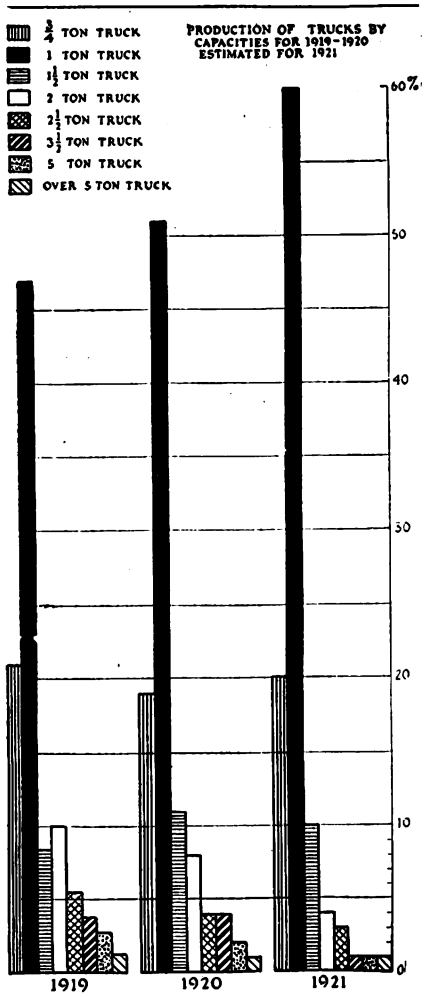
How to Select Test and Use Carburizers. Practical help for men working in carburizing material. Percentage of carbon in the case and rate at which it decreases toward the center, supposedly left soft, are the important points, according to this author, not the depth of penetration. Material specifications are given, rules for selecting the carburizer, causes of soft spots, selection of pots, dependence on the furnace, etc. S. P. ROCKWELL, *Automotive Industries*, 5-4-22, 3300 w. MAH.

Cutting Spur Gears by Hobbing. Fourth article in a series describing the manufacture of gear by each of the different type of machines which may be employed for this purpose. This takes up hobbing, and is restricted to spur gear hobbing. The mechanical action necessary is described quite thoroughly, then the different machines on the market, the methods of handling the work in and on each. Much other data on gear hobbing. *Machinery*, 5-22, 7600 w. MAH.

Cutting Spur Gears on Gear Shapers. The third article of a series on the use of different types of gear-cutting machines for cutting various classes of gearing. This deals with machines which operate with a planing or shaping action, and includes the new Stevenson gear shaper which fines a gear complete at one stroke. Interesting details of the machines, their work, work-holding fixtures, including some special and difficult jobs. *Machinery*, 4-22, 5300 w. MAH.

Radial Play in Bearings. Radial play may be slight and still have large influence on efficiency of bearing. This expert for one of the large bearing companies tells exactly what its influence is, how it is noted and measured, and what measures should be taken to avoid it. T. C. D. CROW, *Motor Trade*, 4-22, 1200 w. MAH.

Milling Eight Transmission Covers at One Time. Article describes the methods used in one plant making transmission parts. The cluster gear with seven different sizes is cut in one operation, four spur gears are machined in another machine with one set-up, by the use of a large and very special fixture 24 shackle pieces are milled at once, in another fixture used on continuous milling 80 hand-brake levers are finished per minute, still another permits the production of 40 starter covers per hour, and another allows complete machining (milling) of eight transmission gear case covers at once. The article describes all this equipment, and the methods of using it. J. H. MOORE, *Can. Machinery*, 5-4-22, 1950 w. MAH.



The increasing demand for the light truck is shown in this production chart of trucks by capacities, estimated for 1921.—*(Automotive Industries.)*

Bearing Composition and Renewal. Bearings are of particular importance, and their composition and renewal equally so. This article describes composition of various kinds of solid, ball, roller and other bearings. Also methods by which they are renewed when worn, or adjusted while in service. Some topics discussed are plain bearing alloys, bearing lining metal, alignment and misalignment, renewal, hot metal may spring shaft, melting out old babbitt, heating entire bearing, etc. *Motor Truck*, 4-22, 7100 w. MAH.

Cables or Rods for Brake Couplings. Many European makers appear to believe that cables are superior to rods for brake operation because of the fact that they use the former by preference. This British author gives examples of practice on the other side in the end fastenings, arrangements to give equal pull, and other details of cable use. M. W. BOURDON, *Automotive Industries*, 5-18-22, 1600 w. MAH.

New Line of Bevel and Internal Truck Axles. Describes the 1922 lines of truck axles to be produced by the Russel Motor Axle Co. This concern has specialized on the internal gear drive previously, so the production of bevel gear axles is more or less of a departure. These are to be made in three sizes, all for light trucks of ¾, 1 and 1½ tons capacity. Details and drawings. *Automotive Industries*, 4-6-22, 700 w. MAH.

Where Our Tires Start. Contrary to general opinion, rubber is not sap of rubber tree, but is fluid called "latex," found between corky outer part and hard, thin inner tissue incasing the wood. One of best tapping methods is diagonal cut extending third way around tree. Cuts are made with razor-like knife. Cuts carefully made, so they are not too deep, too wide, or not sufficiently deep, in order to obtain maximum quantity of latex. *Motordom*, 4-22, 1500 w. BS.

Detonation—A Consideration of Its Causes. The tendency of fuels to detonate has puzzled automotive engineers for several years, and this author, in charge of the investigation work of the National Advisory Committee for Aeronautics, describes some of the results of its investigations. The inference is that charge temperatures and pressures before combustion have been considered from the standpoint of their influence upon the temperatures and pressures after combustion, rather than their influence on the rate or nature of the combustion. No definite conclusions are drawn beyond presenting the experiments of the committee and others, especially Harry Ricardo, of England. STANWOOD W. SPARROW, *Automotive Industries*, 5-4-22, 5400 w. MAH.

Motorists pay an average of $34.67 each in various forms of taxation.—*Tractor World.*

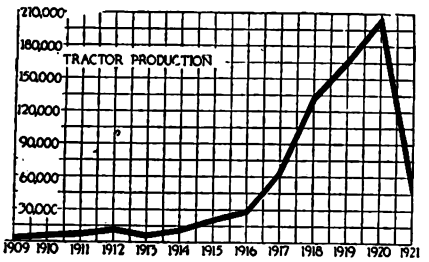
Economics of Motor Transport. Starting with the startling statement that motor trucks are today transporting one-eighth as much tonnage as all the railroads of the country (300,000,000 tons against 2,400,000,000 tons), author outlines entire transport situation. He discusses in order highway efficiency from all standpoints, transport efficiency, and vehicle efficiency. He presents each and every phase of the matter in a fair manner and reaches the conclusion that much additional research is needed, also that motor vehicle manufacturers and users should have a larger voice in the construction of the country's roads, especially those which are national in scope and paid for out of public funds. M. C. HORINE, *Power Wagon*, 5-22, 8100 w. MAH.

Seventeen thousand miles is the average service car owners put their automobiles to in three years.—*Tractor World.*

Truck Overloads and Road-building. Author says "Highway design must necessarily be based upon traffic, and the behavoir of the various details of design observed under different ranges and types of traffic; highway transportation is in a state of flux; an immense growth may be anticipated in the next decade." The discussion of the various factors in this situation, such as the character of the major loads and overloads, is based upon the Connecticut census of roads, which was taken in the Spring and Fall of 1921. The most surprising point he makes is that regular trucking concerns are more guilty of overloading than irregular or occasional shippers or truckers. J. G. MCKAY, *Power Wagon*, 5-22, 8400 w. MAH.

Automobiles are replaced with new ones on an average of every five years. —*Tractor World.*

Heavy Trucks and Permanent Roads. Author discusses what is generally understood by a "permanent" road, and what it is actually. Subsequently, he takes up such pertinent topics as foundations, surface materials, proper and improper methods of construction, etc. Next he takes up the problem of taxation to meet increased cost of such road as present-day trucking seems to demand, and concludes that truck owners and users as a class should pay practically all this, despite admitted public



Tractor Production in the United States, 1909-1921, inclusive.—*(Automotive Industries.)*

benefits to all classes of better highways. E. J. MCCAUSTLAND, *Power Wagon*, 5-22, 3100 w. MAH.

Ten years ago the annual production of automobiles in this country was 181,000; today the capacity is 2,750,000.—*Tractor World.*

Use of Tractor with Grain Drill Assures Better Planting. Argument for the more universal use of tractor indicates that farmer using it may expect better seed distribution, ability to do work at proper time and greater certainty of results. From dealer standpoint, this method should be urged for it means greater sales possibilities. Types of drills for tractor use, two methods of feeding the grain, increased usefulness through use of attachments are among the topics treated. E. R. WIGGINS, *Chilton Tractor*, 5-1-22, 2100 w. MAH.

Only 13,574 manufacturing plants employ over 100 workers.—*Tractor World.*

Notes on Propeller Design. In this instalment the energy losses of the propeller are taken up, and all of them developed mathematically. Essentially an article for the designer and pure technician. MAX M. MUNK, *Aerial Age Weekly*, 5-1-22, 2500 w. MAH.

Eliminating Fires in Airplanes. Author describes special studies of this subject which have been made by the Air Service and shows the progress which has been made in the last year toward fire prevention and fire extermination as well. C. H. BUTMAN, *Aviation*, 5-1-22, 900 w. MAH.

Forest Mapping and Estimating from the Air. A development of aerial photography, showing the application of this kind of work, to the practical everyday needs of a large Canadian lumber company. The area mapped was 140 sq. miles, and the work was done in 12.8 hr. at less cost than the usual timber cruising, which takes months. *Aviation*, 5-8-22, 1100 w. MAH.

Communications and Beacons on Air Routes. Author points out needs for continuous communication with pilots of aircraft, and gives a most desirable method of radiotelegraphy and radiotelephony. Details of the various sets used in both are given. Beacons are dealt with separately, with reference to both day and night beacons. CAPTAIN FRANCK, *Aerial Age Weekly*, 5-1-22, 2400 w. MAH.

Notes on Landing Places for Seaplanes. This deals specifically with the available landing places along the Atlantic Coast, and has been prepared with great care by the National Advisory Committee for Aeronautics. All the landing places in New Jersey, Delaware, Maryland, North and South Carolina and Georgia are described. EWING EASTER, *Aerial Age Weekly*, 5-1-22, 2100 w. MAH.

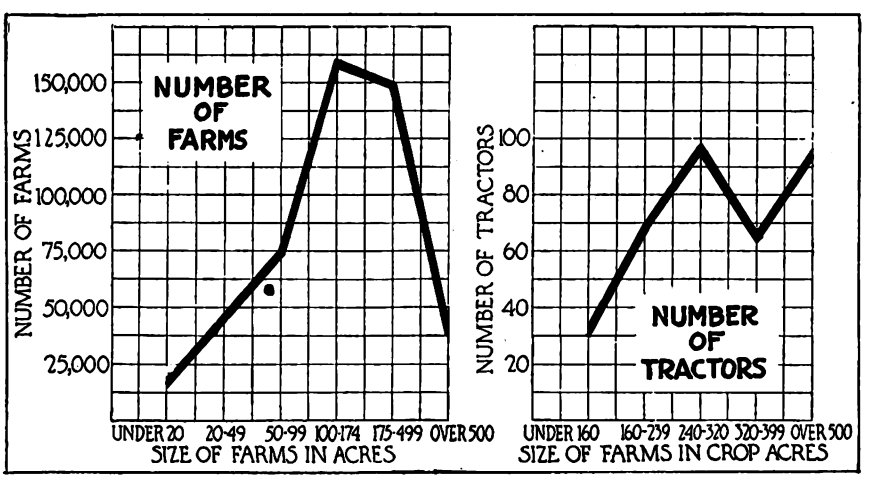
Principles Governing the Establishment of Meteorological Stations. The subtitle, Along Air Routes, taken with the main title, explain exactly what this article describes. The author divides his subject into two parts, distribution and grouping of stations and communications, and develops each topic fully. P. AUJAMES, *Aerial Age Weekly*, 5-1-22, 2150 w. MAH.

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Distribution of tractors on winter wheat belt farms by sizes of farms.—*(Automotive Industries.)*

BUILDING·CONSTRUCTION

Better Type of Construction Ahead

SPECULATIVE construction has now reached a point where, in many parts of the country, the demand of medium-priced apartments and small houses has been met almost to the point of saturation, points out *Architectural Forum.* This, it is believed, indicates that the crest of the first wave of building activity has been passed and that we are now entering the second and sounder period in which better types of buildings will be constructed. An encouraging feature of this development is that the flow of building materials will be diverted from speculative channels toward the construction of a great number of educational and institutional buildings, public buildings and business buildings. The present shortage of building materials is expected to be offset by the increased production activity which is to be noted at the plants of many building material manufacturers.

It is predicted that the cost of building will decline gradually, and that the average building project may now be undertaken without fear of a too great decrease in reproduction value with a consequent shrinkage of investment and mortgage loan collateral.

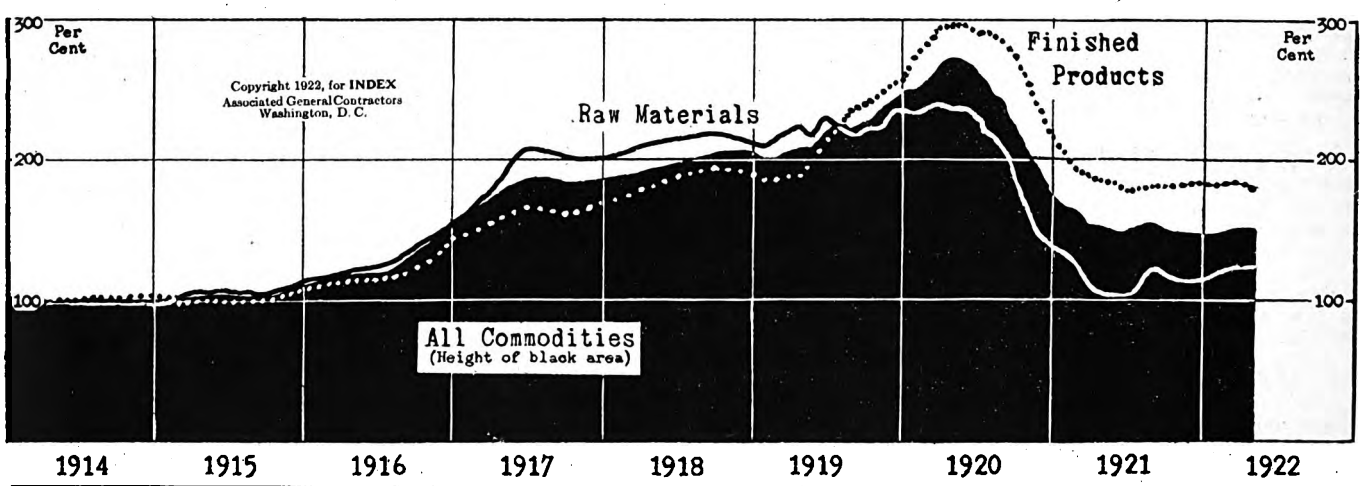
Architectural Acoustics. The first of three articles on the nature and reduction of office noises. Describes methods and results of studies in the noiseproofing of three Federal Reserve Banks. PAUL E. SABINE, *American Architect,* 5-24-22, 3000 w. EMcC.

Building Code Uniformity. Editorial discussion showing that of 15,400 incorporated villages, towns and cities in United States with total population of 54,000,000, and 12,000 "rural communities" with total population of 9,000,000, less than 3% have any building regulations. There are 2800 cities with populations in excess of 2500, of which 1478 have populations in excess of 5000, yet very few under 5000 have any building regulations and only 27% of those having populations in excess of 5000 regulate the character of construction. Many regulations are of little value and many of the municipalities have no means for enforcing even their inadequate regulations. Proposed regulations for reinforced concrete design prepared by a Joint Committee, consisting of eminent specialists in concrete work are discussed. Two tables show distribution of costs of various parts of concrete buildings in eight cities compared with costs under proposed regulations. Comparisons show reason for differences found in building codes. *Amer. Architect,* 6-7-22, 1500 w. E. McC.

Practical Building Regulations for Concrete Block. Discussion of building code regulations to govern manufacture and use of concrete block, brick and tile, prepared by Portland Cement Association, with ways and means for their enforcement by city authorities. A. J. R. CURTIS, *Concrete Products,* 5-22, 2000 w. CS.

Design and Standardization of Mouldings. Illustrated article covering progress in reducing number of mouldings and standardization. THEODORE F. LAIST, *National Builder,* 6-22, 2000 w. CS.

Concrete Construction. General trend of changes in concrete work has been simplification, but simplification has not come in form of standardization as with structural steel. Doubtful if concrete construction usage will ever become matter of selection and use of standard sections, because of extent of field and of adaptability of concrete to any size or shape. Chief uses are for oundations, concrete piles, substructure walls, retaining walls, floors, slabs, beams, columns, and sidewalls, and or variety of purposes in farm groups. WALTER W. CLIFFORD, *Architectural Forum,* 5-22, 2500 w. HHH.



Prices of Raw Materials and Finished Products Since 1914

The top edge of the black area shows how the wholesale prices of all commodities have varied since 1914. It seems clear now that since the middle of 1921 we have been on a new price level, slightly more than 50% above that which prevailed before the war. While this is the average condition, it is true that many kinds of goods are a long way above or below this new level. The group of commodities which the Department of Labor classifies as building material is still at slightly more than double the 1914 price, and housefurnishing goods are still higher at 211. On the other hand, metals are 17%, and farm products 26% above the pre-war figures. One interesting circumstance in regard to this unbalancing of prices is that in general the raw materials are below the average and the finished products above. The materials whose prices are represented by the solid line are principally raw materials—the products of agriculture and of mines—while those represented by the dotted line are commodities on which a great deal of work has been done, or the finished product. At the beginning of our participation in the war, the prices of raw materials rose faster than did those of finished products, but with the beginning of the post-war boom, in the middle of 1919, these positions were reversed, and have so remained up to the present time.—*(Index.)*

Elements of Concrete and Steel Construction. Details of concrete and steel construction, illustrated by diagrams. Essential elements of strength in reinforced concrete lintels, pre-cast tile lintels, cornices, plate girders, lattice girders, fireproofed steel floors and metal lumber floors. ELWYN E. SEELYE, *Pencil Points*, 6-22, 1200 w. HHH.

Design, Construction and Use of Metal Flumes. Description of semi-circular flumes from standpoint of types, supports, stresses, expansion, end structures and surface coverings, based on Reclamation Service experience. Technical article, illustrated with drawings and diagrams. JULIAN HINDS, *Eng. News-Record*, 5-25-22, 7000 w. CS.

Specifications for Concrete Construction. Continuation of editorial discussion of practical considerations in writing of specifications for concrete construction. Article takes up deposition of concrete in forms and finishing of surfaces. *American Architect*, 5-10-22, 2500 w. EMcC.

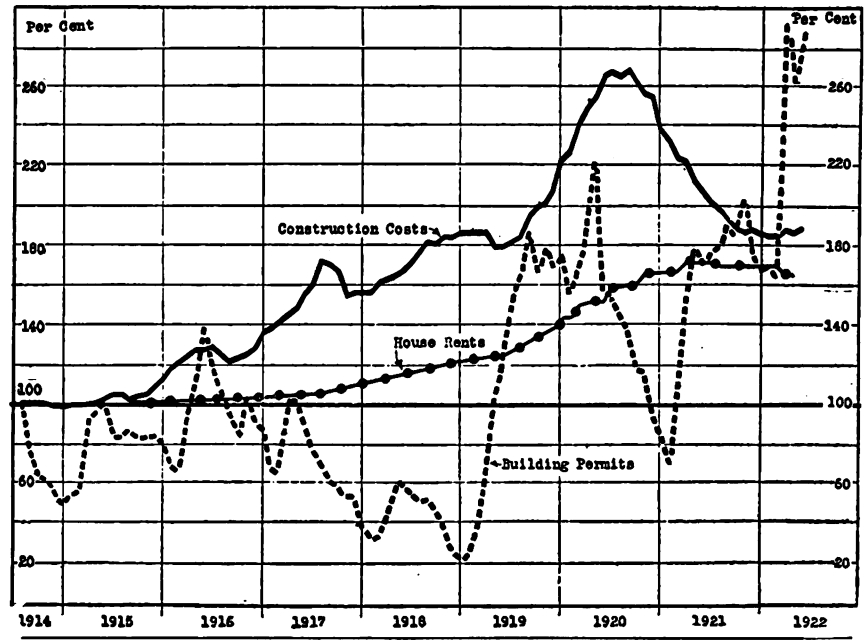
Sanitation with Regard to the Sewerage Systems of Buildings. Bacteriologist's views regarding present sewerage systems. Claims present systems not sanitary and cannot be kept sanitary by present methods. Covers formation of and troubles incidental to uric acid scale accumulations. Boiling water will not remove scale. Pipes should be as nearly perpendicular as possible. Poor sanitation provides source of infectious disease. *Bldgs. & Bldg. Management*, 5-1-22, 2000 w. CS.

Important Factors in Building Hollow Walls. As hollow walls become better known they are sure to be more and more popular. Covers insulating and heat-conserving properties of hollow walls and their economy. LESLIE H. ALLEN, *Permanent Builder*, 5-22, 1500 w. CS.

Right Angle Triangulation as Applied to Pipe Fitting. Treatise on pipe-fitting measurement. All pipe-fitting measurements involving triangulation which can ever be taken in actual work, can be reduced and represented by outlines of right angle triangle. Triangulation method simplifies solution of all difficult triangular pipe-fitting measurements and similar problems as well as processes of solutions. Illustrated with diagrams. Part I. DENIS KEOHANE, *Sanitary & Heating Eng.*. 5-5-22, 3500 w. CS.

Estimating Cost of Highway Bridges. Two kinds of estimates—preliminary based upon approximate data and should not vary greatly from estimate made from detail plans; and final made after surveys and plans are completed and represent engineer's best judgment regarding reasonable final cost. Dividing estimate into various labor, material and transportation costs is advisable. WALTER S. TODD, *Municipal & County Eng.*, 5-22, 1200 w. CS.

Pricing of Roofing. To price by square foot is fundamentally wrong as a cut up roof with battlements. pent houses, skylights and chimney flashings is a roofing job and not a plain roof to be covered. Each job should be estimated for itself and not on a general square footage basis. *Sheet Metal Worker*, 5-12-22, 1000 w. APS.



Building Boom Continues As Costs Decline

Since the latter part of 1921 construction costs have been fairly stable, and with no immediate prospect of their further decline, building activity was further stimulated. The abundance of cheap money was also a factor contributing to the building boom that has swept over the country since last March. Measured by the value of the permits, the amount of building under way at present breaks all previous records. The total value of the permits for the cities enumerated is nearly three times that of the first months of 1914, but part of this increase is due to the increase in the cost of building material and in the wages paid in the principal business trades. The combined index for wages and materials on which the curve of construction costs in the accompanying chart is based is now a little less than twice that of 1914. Meanwhile house rents for the average wage-earner, as computed hy the National Industrial Conference Board, have declined slowly from the peak of 71% above the pre-war level, reached in March, 1921, to 65% above that level.—*(N. Y. Evening Post.)*

Arc Welded Steel Building. By arc welding steel framework savings in time, labor and materials were obtained. Description of method of making joints. The welds passed all tests made by engineers. Five photographs. B. C. TRACEY, *Welding Engineer*, 5-22, 800 w. APS.

Caisson Cofferdam Foundation with Special Bracing. Description of deep cellar substructure in filled ground, caissons braced by built-up struts during excavation, toe wall holding caissons against sliding. Covers: special requirements of filled ground, caisson design, joints, preparing ground, sinking, cofferdam bracing, caisson toe wall, costs. T. KENNARD THOMSON, *Eng. News-Record*, 6-1-22, 3500 w. CS.

Building Costs. Tabulation of costs is given for buildings in a number of States, describing types of construction, equipment, total cost, cost per cubic foot, date of contract. Tenth of series of cost tables, figures for which are furnished by architects of buildings mentioned. *Amer. Architect*, 5-24-22, 1000 w. EMcC.

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Standardization in Building Industry. Covers results of work of U. S. Department of Commerce to standardize various building materials and reduce waste. JOHN M. GRIES, *Building Age*. 5-22, 1000 w. CS.

Two-Hinged Timber Arch Used as Temporary Railroad Bridge. Description of structure designed as falsework for erecting 120-ft. girders. Logging railroad traffic now carried by structure. W. J. H. FOGELSTROM, *Eng. News-Record*, 5-4-22, 1500 w. CS.

Design and Construction of Lightweight Floor Systems. Covers practical details of long spans for light loads, comprising core construction, steel joist and precast slab types with special attention to core system. JACOB FRUCHTBAUM, *Eng. News-Record*, 5-4-22, 6000 w. CS.

Structural Design Problems. Second, and final, instalment of article on determination of bending moments, shears, reactions and loads on columns for floors and beams of continuous spans. The methods illustrated are graphical and are given without the use of mathematics. *American Architect*, 5-24-22, 2000 w. EMcC.

Selling Furnace Heating. An address read at meeting of Roofing, Metal and Heating Engineers, containing practical suggestions for arousing enthusiasm in buyers for this method of winter comfort in homes. M. J. LENIHAN, *Sheet Metal Worker*, 5-12-22, 750 w. APS.

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Asphalt Consumption Doubled

PERHAPS you thought that the increase in the use of concrete for roadways and the large use of special binding preparations for macadamized roads had cut down the use of asphalt in this country. If so, you will be surprised to learn that the consumption of asphalt in the United States has almost doubled since 1915. The total consumption, including that made from Mexican oils, that made from domestic petroleum, and that known as "native" asphalt, was 2,023,665 tons in 1920, while in 1915 the total was 1,225,447 tons.

In the production of asphalt from domestic petroleum in 1920 California, with nine operators, ranked first; Texas, with four operators, ranked second, and Indiana, with three operators, ranked third, both in quantity and value. These three States reported 82% of the total quantity and 80% of the total value of production in the United States. The outlook for the asphalt business is very promising.

Alumina Cement: Its Development, Use and Manufacture. Gives history and properties of high strength, quick-setting cement now being produced commercially in France. HENRY S. SPACKMAN, *Eng. News-Record,* 5-18-22, 2500 w. CS.

Cement Making in Iowa. Description of three plants and methods used. Covers Gilmore, Pyramid and Western States plants. *Rock Products,* 5-6-22, 3500 w. CS.

Modern Japanese Cement Plant. Concluding article of series. Covers: kilns and coolers, coal mill, clinker storage. clinker grinding, storage and packing, power plant, statistics of Japanese cement. *Rock Products,* 5-6-22, 1200 w. CS.

Properties of Concrete. Results of official tests conducted for controller-general of merchant shipbuilding in England. Results of interest to reinforced concrete engineers whether engaged in ship construction or not. *Concrete Products,* 4-22, 1000 w. CS.

Control of Asphaltic Concrete Mixes. One of the most essential things about operation of asphalt plant is to have adequate and reliable control of all material that enters into mixture. Gives methods used at Minneapolis. ELLIS R. DUTTON, *Municipal & County Engineering,* 4-22, 500 w. CS.

Waterproofing Concrete. Descriptive article, with discussion, on waterproofing of concrete by all known methods. Intended to give specification writers sound foundation on which to base writing of specifications for waterproofing of concrete work in buildings. *Amer. Architect,* 6-7-22, 2500 w. EMcC.

Grading and Measuring Concrete Aggregates. Rigid specifications for concrete aggregates may bring satisfactory results, but concrete likely to be costly. Lack of tolerance more harmful than beneficial. Recommends certain tolerances and gives results of use. R. C. YEOMAN, *Rock Products,* 5-6-22, 1500 w. CS.

Making Concrete Products. Results of research work presented to American Concrete Institute, covering technical production problems and marketing. Covers design and layout of plant with diagrams, curing, designing, heat, boiler, coal, radiation system, marketing. J. W. LOWELL, *Rock Products,* 4-8-22, 4000 w. CS.

First Principles in Quarrying. Covers briefly best methods and necessary equipment. *Stone,* 5-22, 1000 w. CS.

Practical Stone-Cutting and Drafting. Part XX. Covers cylindrical vaulting and domes. ED. W. HIND, *Stone,* 5-22, 600 w. CS.

Statistics on Stone Production. Gives latest government statistics on granite and marble production. Stone sold in U. S. in 1920 showed increase over 1919 of 20% in quantity and 38% in value. *Monumental News,* 5-22, 500 w. CS.

Importance of Soapstone to Commercial Operations. Most soapstone quarried in Virginia. Covers occurrences, methods of quarrying and principal uses. RAYMOND B. LADOO, *Cement, Mill & Quarry,* 5-5-22, 1500 w. CS.

Selecting and Proportioning Sand Asphalt Paving Mixtures. Sand constitutes from 70% to 80% of coarse mixtures needed in sheet asphalt paving. Sand should pass 10-mesh sieve, but not more than 5% pass 200-mesh sieve. Gives three-group method of grading, using triaxial diagrams. Triaxial diagrams illustrated and fully described with examples. PREVOST HUBBARD, *Rock Products,* 6-3-22, 4000 w. CS.

Asphalt Paving Inspection. Gives methods and results of asphalt inspection system used in Binghamton, with copy of forms used. W. EARL WELLER, *Highway Engineer and Contractor,* 5-22, 1500 w. CS.

Making Prepared Gypsum Plaster. Description of compact, effective plant making cement and wood fibre, sanded and unsanded. Also markets for sand as separate product in addition to prepared gypsum plaster. *Rock Products,* 5-6-22, 1500 w. CS.

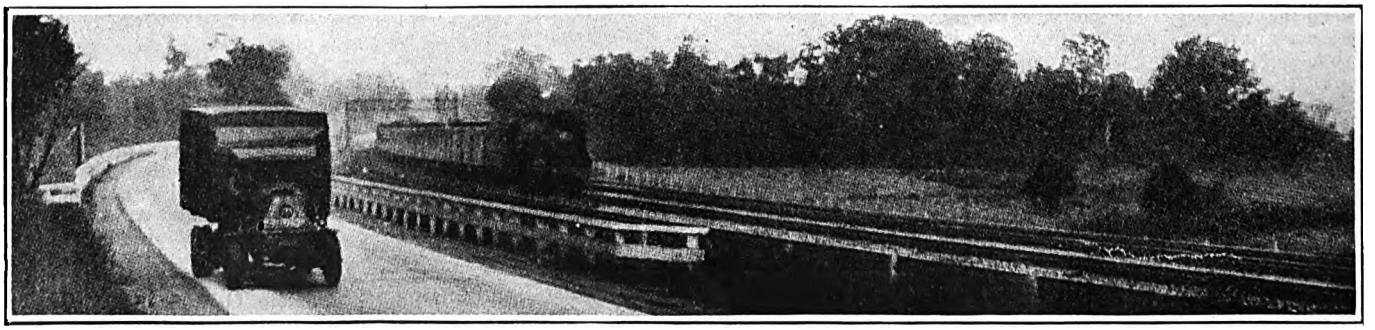
Difference in Solubility and Availability. Part XVI. Covers various forms of phosphates, with deductions concerning capacity of plants to utilize them. GEORGE A. OLSON, *Cement, Mill & Quarry,* 5-20-22, 800 w. CS.

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The Lincoln Highway in New Jersey is the most heavily traveled road of its length in the United States, being the main line between New York City and Philadelphia. The 15 miles of non-permanent pavement on this highway cost $7,918 per mile for maintenance in 1921. The picture shows concrete pavement near Metuchen, N. J.



Corn Exports Show Increase

ALTHOUGH the exports of cereals amounted to more than 1,000,000 tons in April, as compared with a pre-war average of 250,000, it is estimated that about half of this amount is made up of corn. For the past six months corn exports have increased, while wheat exports have been steadily declining. The total corn exports for the last four months are more than 850,000,000 bushels, against 38,000,000 bushels for the corresponding period last year and an average of 24,000,000 bushels for the 1910-14 period.

In the opinion of *Modern Miller* this enormous increase in corn exports is in part due to relief corn sent to Russia and in part to large purchases by other countries for direct consumption. It is believed that the relatively low price has been a big factor in this increased demand and that the extensive advertising which corn has had, due to its use in relief work, has been an important factor. It is hoped that a new permanent outlet may be established for the present great surplus in the United States.

Spring Wheat Dockage. Proportion of dockage or weed seed, found in products of spring wheat area, of Northwest has been increasing for several years past. The average dockage for 1903 was 2.2%, for the 6-year period ending 1914 it was 2.9%, while for the 6-year period ending 1920 it was 4%, and for the 1920 crop alone wheat as marketed up to Jan. 1, 1921, stood an average dockage of 5.1%. Cheaper for farmer not to remove dockage. U. S. Dept. of Agriculture finds average amount of foul, or weed seed sown in drills average more than 2%. A plea for better practice and how to cut down percentage. *Price Current-Grain Reporter,* 5-24-22, 1600 w. WRB.

Grain Elevator Construction. Site chosen should be one where main travel can reach elevator with smallest inconvenience. For a country receiving station, elevator that will hold three days' receipts at one time is sufficient. Should have bins enough to hold full carload of each kind or grade of grain received during any one season of year, together with one empty bin for second carload, and another bin to hold wet or heated grain in case of necessity. Equipment should be heavy enough to handle grain as fast as it can be dumped and bins should be self-cleaning. Two most important considerations are foundation of elevator, and power system. In designing elevator, pressure, and variation of loading and unloading stresses must be taken into consideration. *Grain Dealers,* 5-22, 1800 w. HHH.

Automatic Box Car Unloading in Grain Elevators. Description of modern methods for removing grain from box cars, either of the normal type or specially built. These include the power shovel method, the automatic dumper in which the car is tilted so the grain flows out through a special chute inserted in one of the side doors, this being a side tilting method, and the automatic unloader in which endwise tilting only is employed, this method being otherwise the same as side tilting. Cars and unloading apparatus are described in considerable detail. C. D. Howe, *Can. Railway & Marine World,* 4-22, 9600 w. MAH.

A medium size tractor with four-plow bottom can turn 13 acres per day. The old hand plow and two horses could handle 2½ acres—not more.—*Tractor World.*

Grain Elevator Scales. Author's discussions based on 2000 tests of elevator scales, taking up in turn wagon scales, motor truck scales. He gives 11 rules for operating and maintaining automatic scales. Spouting should be direct from scale to car or vice versa. H. H. Alfrey, *Grain Dealers J.,* 5-25-22, 1200 w. WRB.

Science for Bakers. One of series on ingredients used by bakers, this instalment treating spices, telling their origins, their outstanding characteristics and their uses. Spices described are allspice, cloves, cinnamon, nutmegs, ginger, tumeric. Under the head of seeds are anise, caraway, coriander. *Bakers Review,* 6-22, 2000 w. WRB.

Development of Baking Industry. (Part IV.) First two parts dealt with bread making prior to use of modern machinery; the third was on bread mixtures. Current past describes development of flour handling equipment, water scales, sifters, batting reels and the economy of proper machinery and kinds and sizes required for various size shops. Illustrated. *Bakers Review,* 6-22, 2500 w. WRB.

Fire Hazards in Bakeries. Baking industry increased 186% during 1914-19 periods, with still greater growth since then. Fire protection methods and devices are discussed, as are various types of ovens, the steps in production of baked goods and special machinery used, with remarks on the product itself. Article of much value to all bakers containing advice on fire prevention. F. A. Cantwell, *Bakers' Helper,* 6-1-22, 3800 w. WRB.

Value of Good Flour. Sketch of development of milling processes and equipment. Two constituents of flour, from bakers' standpoint—starch, the water absorbent, and gluten, the moisture retainer. Only recently has proper value of gluten been appreciated. Author describes most desirable forms and quality of glutens and other factors that enter into milling good flour. F. H. Becker, *Bakers Weekly,* 6-3-22, 900 w. WRB.

Bread Weight Standards. Investigation by U. S. Weights and Measures Officials showed that large modern bakery made best showing as to standard weight, 99% showing less than a quarter ounce variation either way. Standardized weights simplify production methods and reduce costs. The following tolerances on the net weight of loaves of bread are recommended: 2 ozs. per pound in excess and 1 oz. per pound in deficiency on individual loaves when up to time bread is declared by the seller to be "stale." Tolerance of 1½ ozs. per pound in excess and ½ oz. per pound in deficiency on the average weight of 10 or more loaves of same nominal weight and same brand or kind, with certain specified exceptions. *Bakers Weekly,* 6-3-22, 2000 w. WRB.

Fire Hazards in Bakeries

(From Bakers' Helper)

This table, based on reports by the National Fire Protective Assn. from references by the Underwriters' Bureau of New England, shows the causes of fires in 407 bakeshops.

Cause	*Number*	*Per cent*
Ovens	104	25.6
Unknown causes	70	16.0
Ignition of grease	52	12.8
Matches—smoking	38	10.6
Heating	24	8.4
Chimneys and flues	25	6.1
Lighting	17	4.2
Spontaneous ignition	14	3.4
Rubbish	12	2.9
Miscellaneous	12	2.9
Defective electric wiring	7	1.7
Exposure	6	1.5
Power	6	1.5
Sparks from chimney	4	1.0
Bread wrapping machines	3	0.7
Incendiary	3	0.7
	407	100.0

Analysis of Loss

	Sprinklered	*Unsprinklered*	*Total*	*Per cent*
Loss less $1,000	85	195	280	68.8
Loss more $1,000	6	121	127	31.2
Total	91	316	407	100.0

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Number of Fertilizer Plants Increasing

AS a result of the Department of Agriculture's campaign for the fertilization of land, there has been a notable increase in our production of fertilizer. According to a compilation of the Bureau of Census, made especially for the Finance Bureau of the Senate, there are now 600 establishments in the United States engaged in the manufacture of fertilizer. Their combined capital is $311,633,259 and the value of their products in 1919 was $281,143,587.

In addition to these plants, there are 598 establishments engaged in the manufacture of chemicals. The reason for the recent demand for a high tariff protecting American dye and chemical producers will be easily understood when the following figures are taken into consideration: The capital employed by the chemical plants is given as $484,488,412. A total of $28,338,749 was paid in Federal taxes and $3,592,640 in State taxes. Salary and wage payments amounted to $97,188,958, and the average number of wage-earners employed during the year was 55,586.

Crude Drugs. Analysis of world-wide sources, collection, distribution and quality determination. Some 250 drugs produced within U. S. Majority are gathered in vicinity of western North Carolina. Formerly quality determined by physical appearance. Now chemical and microscopical examinations are used. Today nothing is permitted to be sold as sub-standard quality without its being traced to its last source before release can be obtained from Department of Agriculture. This is in interest of drug trade and cannot but work to advantage of manufacturer. S. B. PENICK, *Drug and Chemical Markets*, 5-17-22, 1000 w. CJW.

Removal of Methane. Method of removing methane from gases to be used in incandescent lamps consists in decomposition of methane into carbon and hydrogen by passage through finely divided nickel at low temperature (about 500°C) with subsequent removal of hydrogen by passage through copper oxide at 500°C. Passage of gas containing 1.5% methane, for example, through nickel at 500°C reduces content to 0.24% and passage through second series lowers it to 0.01%. Advantage in use of nickel rather than copper oxide alone is that lower temperature is possible. Under same conditions of temperature and flow an equal volume of copper oxide gives less than ⅛ decomposition caused by nickel. While mixture of nickel and copper oxide will give equally good results, has disadvantage that charge must be renewed upon exhaustion of copper oxide. Oxidation of exhausted mass leads to oxidation of nickel at as low temperature as 275°C. Nickel oxide in such mixture is not catalytic and mass is no more efficient than copper oxide alone. G. R. FONDA and H. N. VAN AERNEM, *J. Ind. Eng. Chem.*, 6-22, 2250 w. CJW.

Analysis of Palladium. It is shown that mixture of palladium and platinum may be quantitatively separated by dissolving in aqua regia, evaporating to dryness, moistening with hydrochloric acid, adding little distilled water and then a 1% alcoholic solution of dimethylglyoxime, drop by drop, until there is no further precipitation. The yellow precipitate, containing palladium, is filtered off, washed with water and carefully ignited, first in air to drive off organic matter and then in hydrogen to reduce any oxidized palladium to metal. The metallic palladium is then weighed. C. W. DAVIS, *Reports of Investigations, Bureau of Mines*, No. 2351, 2 pp. CJW.

Gelatin and Glues. Present need for standardization in gelatin and glue testing arises from failure of methods to evaluate material correctly, from lack of standard procedures for measuring properties and from absence of scientific method for expressing data which are obtained. Gelatin content of glue or gelatin and also join strength of glue may be correctly indicated by melting point determination. Neither may be assumed to be, in all cases, proportional to jelly consistency or to viscosity at 60° C. Measurement of viscosity of an 18 per cent solution (dry basis) at 35° C. by means of MacMichael viscometer has been shown to be especially well adapted as an indirect estimation of the differentiation of glues and gelatins in order of their melting points and is recommended as basis for primary evaluation of these products. Tests of jelly consistency and viscosity at 60° C. are of value in secondary evaluation, in determining adaptability of given glue to given service. Other special tests are of value but methods should be stated and uniform method of expressing results should be adopted. R. H. BOGUE, *J. Ind. Eng. Chem.*, 5-22, 7500 w. CJW.

Bleaching Powder. Description of plant of Belle Alkali Co., Belle, W. Va. Crushed lime is hydrated with exact quantity of water necessary, the hydrated product screened and delivered by screw conveyors to chlorinating chambers, which are of concrete. Chlorine introduced under slight suction; finished product removed by means of 4 chutes leading from each chamber on longitudinal center line and extending to point immediately above highest point to which container resting on conveyor in working space beneath would reach. Still necessary to spread lime in chambers and to rake finished product and direct it down chute by hand. Specially designed gravity roller system, very heavy to prevent corrosion as much as possible, handles finished product. G. L. MONTGOMERY, *Chem. Met. Eng.*, 5-31-22, 2500 w. CJW.

Stability of Arsphenamine. Arsphenamine (salvarsan) solutions can be kept under nitrogen gas in ice-box for 4 months without noticeable change. At room temperature color changes noted in about 2 weeks, and at end of 8 weeks 10% oxidation has occurred. Thus temperature is very important factor. P. MASUCCI, *Am. J. Pharm.*, 5-22, 1500 w. CJW.

Potash Brines. Process used at Deep Springs Valley, Cal., is described. The deposit is somewhat richer than that of Searles' Lake. Process of separation consists in boiling pot in which temperature of solution is varied and salts are thrown down in order of their solubilities. First step in cooling vats, holding 3000 gal., which are cooled to 10° C, causing separation of sodium sulfate and some sodium carbonate. Liquor then mixed with mother liquor from previous treatment, concentrated in single-effect Swenson "steam basket" type evaporator until test shows proper content of potash and borax. Foaming prevented by addition of slop distillate combined with use of lead plates in contact with steel of evaporator. During concentration all of salt and remaining sulfate separate and settle out. On cooling concentrated liquor potash and borax separate together and are heated with steam, causing borax to dissolve in water it carries, the potash then being centrifuged free of borax solution. L. A. PALMER, *Chem. Met. Eng.*, 5-31-22, 2250 w. CJW.

Arsenic. Ordinary white arsenic largely by-product recovered from flue dust and fume at smelters in Western States. Number of its salts are used medicinally. The disulfide and trisulfide are used as paint pigments. Trioxide used in paints, for preserving hides, as insecticide, etc. Metal used in hardening alloys. Insecticides main source of consumption, being used in lead arsenate, calcium arsenate, Paris green, London purple, and cattle and sheep dips. Considerable tonnage used in manufacture of weed killers. Consumption in 1920 estimated at 15,000 tons. Present price from 7c to 12c per lb. Estimated glass industry uses 2500 to 3000 tons, sheep and cattle dips, 1500 tons; chemicals (dyes, etc.), 500 tons; insecticides, 5000 to 9000 tons. F. Y. ROBERTSON, *Eng. Min. J.-Press*, 5-20-22, 1500 w. CJW.

Sulfuric Acid Fumes. Discussion of importance of fume problem to chemical manufacturer from standpoint of public health, legislation and economical operation. Fume control could accomplish: Betterment of health conditions in neighborhood, elimination of damage to vegetation, elimination of litigation and improvement of production yields. Work of the atmospheric pollution committee of the American Institute of Chemical Engineers is discussed at some length. J. R. WITHROW, *Chem. Met. Eng.*, 5-24-22, 3500 w. CJW.

Ammonia from Sodium Cyanide. Sodium cyanide and cyanate are readily hydrolyzed, giving theoretical yields of ammonia. Iron present caused sodium ferrocyanide formation, starting at beginning of steaming process and reaching maximum at about 475° C., about which it is decomposed. In presence of sodium carbonate little loss of fixed nitrogen. Proper regulation of temperature during steaming process highly important, as is also rate of steam admission. Quantity of steam added must be sufficient not only to hydrolyze cyanide and related compounds, but also to oxidize free iron present; best to use about 50% excess. With 10-in. batch retorts (capacity 300 lbs. briquets) ammonia recovery of 99% and 100% was obtained, while with 16-in. retorts (capacity 640 lbs.) yields as high as 93.7% were obtained. Continuous steamer developed with estimated capacity of 100 to 200 lbs. of briquets per hour, which gave ammonia recovery of 98%. Advantage of process is that no electric power is needed, but main drawback is relatively high cost of cyanide production. F. E. BARTELL, *J. Ind. Eng. Chem.*, 6-22, 8000 w. CJW.

Kelp-Potash. Products of kelp are potash salts, iodine and decolorizing carbons. Other possible materials are ammonia, tar derivatives, creosote and related materials. Most important product is decolorizing carbon, sold as "Kelpchar," which has been successfully applied to a number of industries. Free filtering, affording rapid filtration and clear filtrate. Can be reactivated and used over repeatedly. Potash obtained is of fertilizer grade while iodine can be prepared of any grade desired. J. W. TURRENTINE, *Chem. Age*, 5-22, 1000 w. CJW.

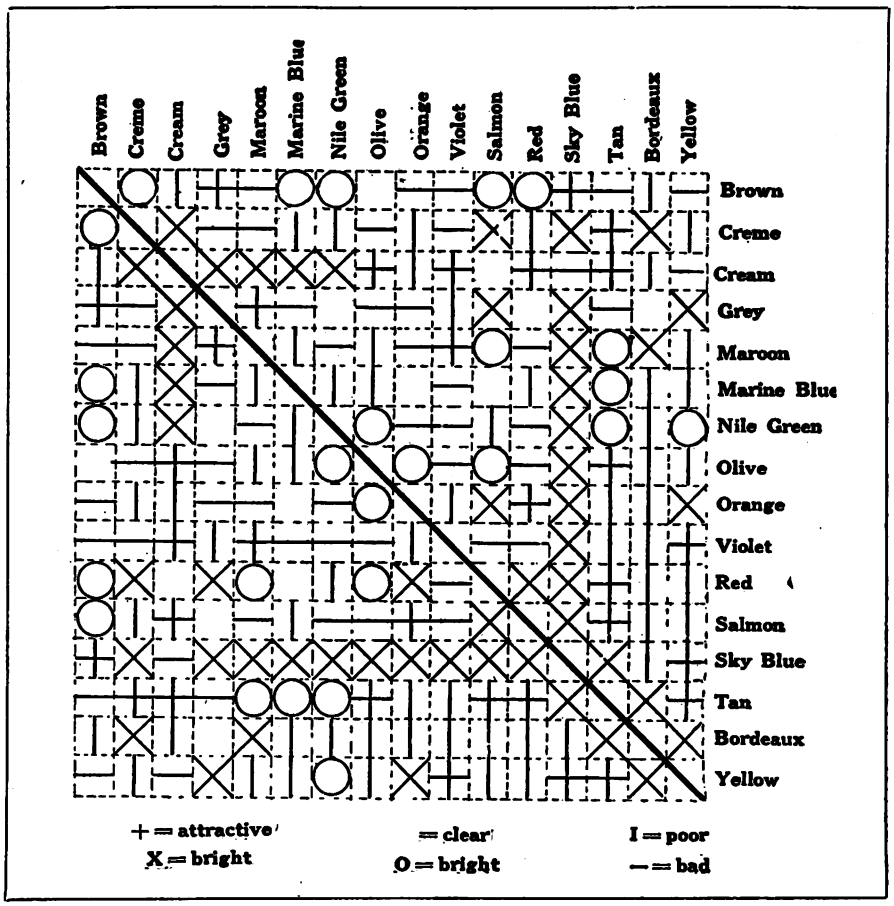
Interesting Sources of Natural Dyestuffs. Henna is well-known dye plant in Orient. Always been used extensively in India, still employed there for coloring leather and certain fabrics. Use is chiefly confined to tropics. Tutu plant is tropical dye-yielding shrub. Dye is considered superior to logwood, due to purity. Woolen materials take it readily, silk less, and linens still less. Osage orange important dye-yielding plant in the United States, native of southern Arkansas and westward to Oklahoma and Texas, though hardy elsewhere. Yields yellow dye claimed to be superior to fustic. Supply of osage orange said to be limited. Gamboge is important, little-known gum-resins, imported here from Siam. Besides dye, valuable as water-color pigment. Loblolly tree's inner bark was used extensively by early settlers here for dyeing purposes. Lead to almost complete exhaustion of forests. C. D. MELL, *Textile Colorist*, 5-22, 3000 w. MBB.

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Color Combination Chart of Interest to Dye Makers

This chart, prepared by *Le Moniteur de la Maille* as a guide for designers of garments, shows effects obtained by combining different colors, value of combination being indicated at point of intersection on chart. For example, grey ground and maroon trimmings make attractive combination, green with red trimmings give very bright effect, while salmon with maroon produces very bad effect. The value of these combinations varies with localities where combinations are seen. In bright seaside sunlight or in the mountains, many diverse combinations are permissible, natural surroundings entering, in a certain measure, into the harmony of the colors.—*(Textiles.)*

Low-Temperature Coal Tar. Detailed study of nitrogen bases, alcohol and sulfur compounds, saturated and unsaturated hydrocarbons found in low temperature coal tar (Carnocoal process). Nitrogen bases are 80% tertiary, 20% secondary. Both are unsaturated. No alcohols are present. Hydrogen sulfide is present but carbon disulfide is absent. No single hydrocarbon preponderates in quantity. The nonsaturated hydrocarbons belong to same series of cyclic unsaturated hydrocarbons as those occurring in "vacuum tar." Solid aromatic hydrocarbons are absent; liquid aromatics are present only in traces. J. J. MORGAN and R. P. SOULE, *Chem. Met. Eng.*, 5-24-22, 2500 w. CJW.

Dyes Containing the Furnace Cycle. Stable dyes can be obtained from furfural aldehyde and pyromucic acid. In accordance with theory, the furane analog of malchite green has a deeper color than the latter. It is an equally stable dye, giving handsome effects on silk and wool. R. R. RENSHAW and NELLIE M. NAYLOR, *Textile Colorist*, 5-22, 800 w. MBB.

Fullers' Earth. Fullers' earth highly siliceous clay, usually indurated, with property of absorbing certain organic coloring matters from vegetable and mineral oils. This property can be determined only by experiment. Florida and Georgia lead in production. Characterized by light weight. Few oils can be used for bleaching both mineral and vegetable oils, but usually limited to one field or another. Description of processes of preparation. Losses in use due to oil film, absorption in pores of earth and in small and inaccessible voids between particles. Technical development in production is next step and will lead to markets otherwise beyond attainment or even conception. T. P. MAYNARD and L. E. MALLORY, *Chem. Met. Eng.*, 6-7-22, 1800 w. CJW.

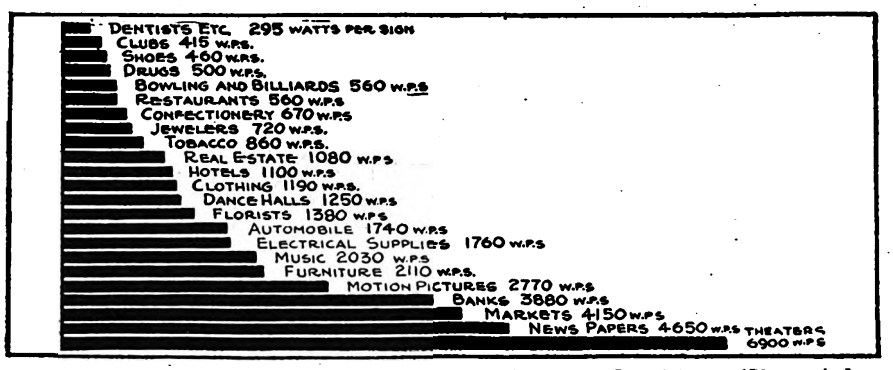
Pure Ceria Earth Compounds. Procedure depends upon certain solubility relations of sulfates. (See graph.) It amounts to fractional crystallization by heating cold saturated solution to 41° C. until mother liquor is obtained that does not show absorption spectrum of neodymium in thick concentrated layers. Cerium is separated from this mother liquor and pure praseodymium precipitated by oxalic acid in acid solution. Ten fractionations by this process gives product free of praseodymium. Cold saturated solution is now heated to 65° C., and fractionation continued until spectrum of lanthanum ceases to show in mother liquor. From this liquor neodymium is easily obtained. Fractionation of the less soluble part gives lanthanum. R. H. F. MANSKE, *Can. Chem. Met.*, 4-22, 1000 w. CJW.

ELECTRICITY

Advertisers' Electric Bill Is Fifteen Million

AN electrical advertising data campaign was recently conducted by *Signs of the Times* with the co-operation of the National Electric Light Association and of the engineering department of the National Lamp Works. Data are available for 40 cities, ranging from a town of 700 people to cities of 300,000, which shows that the average load per display, including all types of signs, bulletin boards, marques, etc., is about 1000 watts.

From the advertiser's standpoint these displays represent a most efficient and effective medium of business promotion, and from the central-station standpoint they represent a profitable source of revenue. The load burns from 1500 to 2000 hours annually and is constant from day to day. Today the total energy consumption for electrical advertising in this country is at the rate of about $15,000,000 annually. If the development for all cities were brought up only to the state already obtaining in 10% of them, this revenue would be increased to $35,000,000 annually. But even in these cities the central stations believe that only a fraction of their market has as yet been developed.



Average load per sign among various users of electrical advertising.—*(Signs of the Times.)*

Fifty-Degree Motor. In this motor rise of 50° C. may be obtained when working at full load over continuous working period. Increase in load of this motor beyond that which it is rated will cause breakdown of insulation; 40° motor has safety factor of 10°. Practically all arguments of 50° advocates are defensive. They arouse suspicion of potential purchasers because of altruistic sound. More frankness on part of manufacturers would be fairer to market. Reduced first cost of 50° motors makes their application more advantageous than that of 40° motors in few limited cases, three cases being given. Few coal mines to which 50° motor can be satisfactorily applied as 50° motor. Only in some cases of centrifugal pump drive would this seem satisfactory. In second class mentioned motor limited to heavy flywheel drives, such as tipple machinery. These motors should then be selected of sufficiently increased capacity so that they will operate at normal load with 40° temperature characteristics. This often means overmotoring and increase in first cost. E. D. KNIGHT, *Coal Industry*, 4-22, 3500 w. CJW.

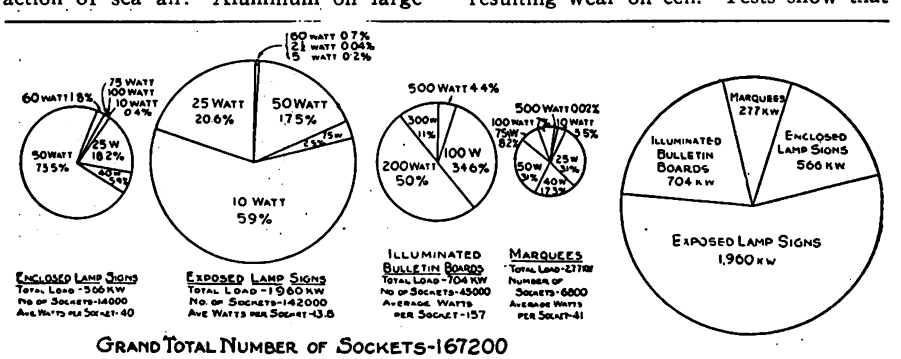
Electric Motors for Grain Elevators. The reduction of danger from fire in the use of electricity as the driving force makes it particularly attractive in grain elevator operation. The different classes of motors which can be used for this purpose are discussed. The question of enclosing the motors is dicussed likewise. Switches, fuses and connections are also gone into. H. E. JOHNSON, *Grain Dealers J.*, 2500 w. IG.

Central Station Power in Coal Mines. Efficient public service has made central station electricity big power supply for coal mines. Various uses of electricity named. Only most favorable private plant of relatively large size could deliver power at same price as central station power. Cost, reliability and service important factors. One important phase of purchase of this power is study rates. Central station should be interested in success and prosperity of its consumers and should be an ally in production which is an advantage in no way offset by private plant. C. J. DAMON, *Coal Trade Bulletin*, 5-16-22, 2000 w. CJW.

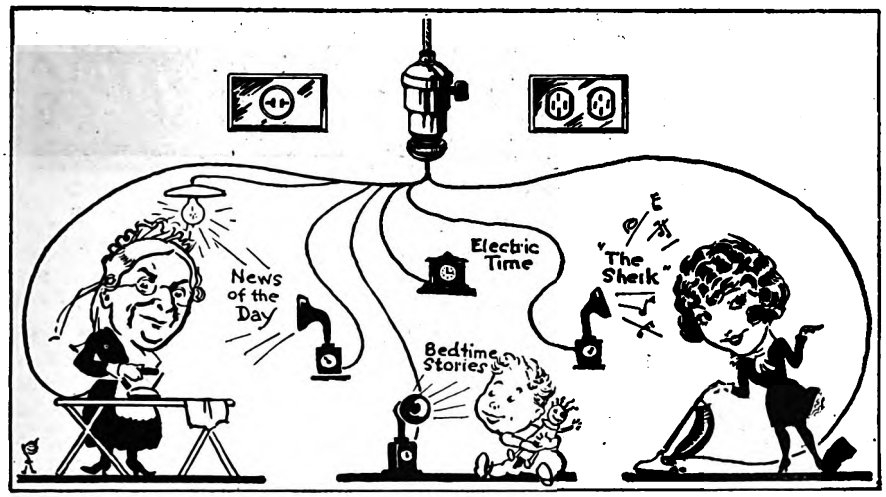
Copper in High-Voltage Transmission Lines. Comparison of relative merits of copper and aluminum in high voltage transmission lines shows copper to be the more advantageous of the two. Mechanical factors in favor of copper. Aluminum does not withstand corrosive action of sea air. Aluminum on large steel centered cable subject to creeping on the steel center on long spans. In sections where dust storms are frequent sand lodging between wires of the strand caused wearing through of the aluminum wire. *Engineering World*, 5-22, 2000 w. IG.

Electrical Wiring Layouts. In larger residences wiring plans should include local equipment for telephones. Conduits for telephones must be continuous from instrument to instrument and splices should be made in terminal block provided for connections. Conduit from nearest outlet should be run to basement to provide for battery. Where burglar alarm equipment is installed, current is generally derived from battery located in basement or through bell-ringing transformers. System may be closed circuit type, or of open circuit type where contact is closed to sound alarm. Open circuit system preferred for residence work. Wiring should be installed in conduit or armored wire. If desired rubber-covered wire may be drawn into stud constructions. Outlet boxes for all types of equipment should be set at points permitting switches and spring contacts to be mortised in door and window frames or elsewhere. NELSON C. ROSS, *Architectural Forum*, 5-22, 2500 w. (To Be Continued). HHH.

Tests of Storage Batteries for Mine Locomotives. Battery cells at present supplied for mine locomotives have sufficient mechanical endurance to withstand ordinary jolts they are likely to receive in service. Damage to bottom of plates and to inter-cell connector of cells, which became loose in trays, points to advisability of having cells tight in tray to avoid unnecessary movement with resulting wear on cell. Tests show that



Distribution of sign load according to type of display and watts per socket in electrical advertising.—*(Signs of the Times.)*



Every electric outlet may soon be not only a source of light, heat, power, and time, but entertainment and instruction as well. Right now it is possible to furnish through one socket or one outlet, simultaneously, all of the different services from any number of separate outlets on the same circuit, at the user's convenience.—*(Electrical Merchandising.)*

no great hazard will result from use of properly installed and cared-for batteries in permissible locomotives. L. C. ILSLEY and H. B. BRUNOT, Bureau of Mines, Reports of Investigations, No. 2358. CJW.

Electrical Phenomena by Metal Deposits. Every mineral body which possesses electrical conductivity for a sufficient vertical distance and which is encased in earth in such fashion that some of its parts are above ground-water level, produces, in surrounding wet rocks, electrical currents which are detectable. Maximum value does not exceed few hundredths of volt with difficultly oxidizable ores and may reach volt in anthracite schists. Action may extend 200-300 meters from great pyritic masses. Theoretical explanation given. C. and M. SCHLUMBERGER, *Eng. Min. J. Press,* 5-20-22, 750 w. CJW.

Caisson with Water-Ballast Tanks Lays Submerged Floor. Description of caisson and method of laying submerged floor at hydro-electric station. JAMES A. BJERREGAARD, *Eng. News-Record,* 5-18-22, 500 w. CS.

Geography of Electrochemistry. Two main applications of electric current in chemistry are source of heat and powerful decomposing agent. Factors in cost of electric heat as compared with combustion heat. Conditions in various countries discussed. Struggle for supremacy is going to be between U. S., Norway, India, China, and Canada. U. S. far in lead now, but rapidly growing manufacturing industries will gradually attract cheap power now available to chemical industry, for they are better able to pay higher price. W. S. LANDIS, *J. Ind. Eng. Chem.,* 6-22, 2500 w. CJW.

Temperature Regulator. Toluene-mercury regulator is placed so bulb dips into water bath. Ton transformer (used for running toy electric trains, etc.) is adjusted to 10 volts, connected with regulator and relay in such way that 110- or 220-volt current through relay will heat electric immersion heater or operate solenoid water valve by which cold water supply from cooler may be either released or withheld. PAUL S. PITTENGER, *Am. Pharm. Assoc. J.,* 5-22, 2500 w. CJW.

Variable Voltage Elevator Control. Perfecting of variable voltage elevator control affords a system which offers many advantages over commonly used rheostat control. New system consists primarily of traction elevator motor connected electrically to a direct current generator. Control is obtained by varying field strength of generator. Various apparatus used is described. Lower power consumption, saving of time in starting and stopping, etc. are mentioned among the advantages of the new system. W. H. PATTERSON, *Building and Building Management,* 5-15-22. IG.

Low Voltage in Mine. Not only does this mean annoyance and impeded operation, but also that more machine and locomotive armatures are burned out when voltage is low and that it involves continuous loss in money. Counter-electromotive force alone saves motor from acting as short-circuit. Where weak power is furnished energy is wasted, for motors run at low efficiency and work is spent in forcing current through line. Efficiency figures are worked out. E. D. KNIGHT, *Coal Age,* 5-18-22, 1600 w. CJW.

Electricity in the House. Fifth in series, dealing with the bedroom. There is a cut of a well-arranged and well-wired bedroom. M. O. WHITTON, *American Architect,* 5-10-22. EMcC.

Radiophone and Automobile. Description of the more compact forms of radio apparatus which are applicable to the ordinary car, and method of adapting the radio for this use. It is pointed out that it would serve well in calling for help when in distress, would help in operating the car, and as a means of pleasure at the end of the day. Various suitable antennae are described. *Automobilist,* 5-22, 2800 w. MAH.

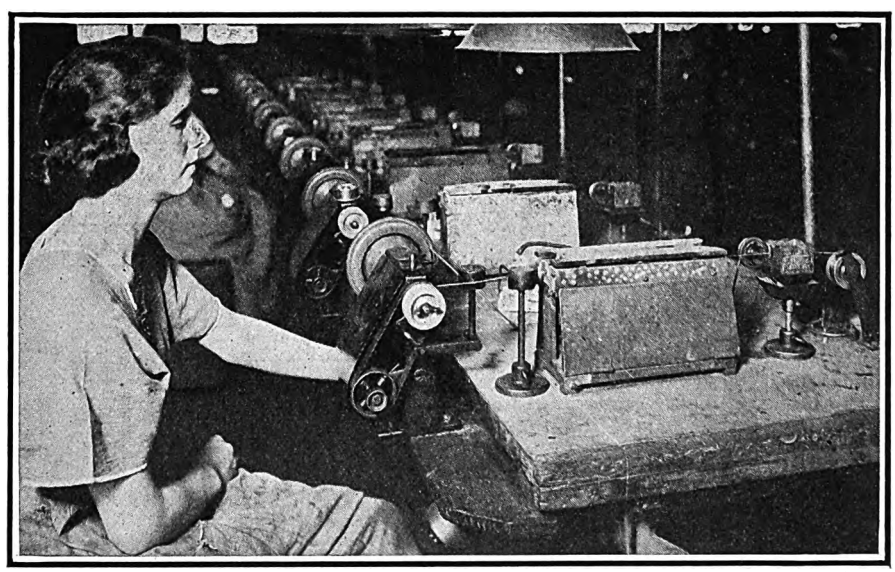
Applying Electricity Scientifically to Factory Problems. The article describes what can be done by adapting electricity to special needs of a factory by an example showing how special conditions in a Hawaiian sugar mill were met by carefully designed machinery and accurately planned layout of the wiring, etc. L. F. LEUREY, *J. of Electricity and Western Industry,* 5-1-22, 4500 w. IG.

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Making Filament for Electric Light Bulbs

This machine draws tungsten wire into the fragile filament used in electric light bulbs, and does the work expeditiously and accurately.—(Photo by *Galloway.*)



Gas Industry on Upgrade

ACCORDING to the *Gas Age-Record,* there has been a 25% increase in the demand for manufactured gas during the last two years. Of the total income from city gas plants (as distinguished from by-product coke plants) almost $280,000,000 of the total $300,000,000 came from the sale of gas; only slightly more than 6% of the total value of gas and by-products is represented by the value of the by-products.

The efficiency of the gas plants is evidenced by the fact that the unaccounted for gas has decreased very much in the two-year period from 1918 to 1920. Because of reorganized company system and increased post-war efficiency only 8.2% was unaccounted for in 1920. This latest figure represents the best average performance the industry has ever attained.

In many other particulars the efficiency of the industry showed marked improvement in 1920. The yield of coal gas in thousands per ton was 3% greater during this year than two years before, and simultaneously with this increase in gas yield there was a 2.7% increase in coke yield. Water-gas plants showed corresponding improvement of operating results, since 10% less solid fuel, in pounds per thousand cubic feet, was required in 1920 than two years before. There was also a decrease in the oil consumed equal to an average of 0.2 gallon per thousand made.

The figures for 1920 show that the gas industry as a whole for that year was decidedly upgrade and it is predicted that the upward trend will continue during the coming decade.

Froth Flotation Tests on Bituminous Coal. Tests on bony coking coal (Wilkeson mine) have shown that cleanest coal can be floated first, bony coal next and ash last by ordinary froth flotation. Very thin oils or soluble frothing agents work best. Fine sizes of coal float most easily and coal in very fine slime will float to some extent without use of any flotation oil whatever. Due to tendency of fine sizes to float so easily, they are practically "overoiled" and produce dirty concentrated when enough oil is added to float coarser sizes. To take due advantage of above facts it is necessary to use flow sheet in which roughing treatment is followed by cleaning of both concentrate and tailings from roughing cell, discarding as tailing material which will not float in any of retreating cells. Re-treatment of middling with original feed is not desirable except for middling obtained in cleaning rough concentrate. By this method clean concentrate can be obtained, bony portions of coal forms middling which may have market value and tailing is too low in coal to be of any value. Attempts to control flotation tests by sink-and-float tests with heavy solutions have failed on fine sizes of coal due to their supposed porosity. O. C. RALSTON and G. YAMADA, *Chem. Met. Eng.,* 6-7-22, 4000 w. CJW.

Coal Amalgam. Discussion of Trent process. With fine grinding almost all but inherent ash is removed. When wet, pulverized coal, suspended in water, is treated with about 30-40% as much oil as there is coal substance, it agglomerates into pasty, plastic mass in which all coal ingredients and oils are intimately mixed. Ash content reduced to practically one per cent. Treat both coal of low-ash content and low grade fuels such as lignite and anthracite culm, containing 30-40% ash. Crude and cheap oil as efficient as higher grades. Greater quantity and better quality of distillates can be made from amalgam than from same materials separately. G. H. DACY, *Coal Age,* 6-8-22, 1500 w. CJW.

Water Returns to Steam Boilers. If pipe connects steam space of boiler with point where return connection is usually made, in effect this pipe becomes part of boiler same as adding section to sectional boiler. Return connections can be attached to this pipe at height corresponding to safe working water level in boiler and thereby secure same result as would be obtained by delivery of water directly to boiler at water line although it is actually introduced at usual bottom connection. Has other advantages. *J. Am. Soc. Heating Ventilating Eng.,* 4-22, 1200 w. CJW.

Fuel Economy. Air washing makes use of process capable of removing from air large proportion of dust, bacteria and solid particles. Recirculation provides plentiful supply of air with no apparent sacrifice of wholesome properties. Fuel economy, figuring 70% recirculation, is calculated to be 52%. Problems pointed out. N. A. HOLLISTER, *J. Am. Soc. Heatin Ventilating Eng.,* 4-22, 2000 w. CJW.

Coal Gas Manufacture. Processes in horizontal, inclined and vertical retorts. Vertical not widely used in America has many advantages. Extent and importance of coal gas industry. Reasons for former ascendency of water gas and the present trend toward increasing use of coal gas. Necessity for a regular by-product market. The role of coal gas in conservation of natural resources. J. J. MORGAN, *Forging & Heat Treating,* 5-22, 3500 w. APS

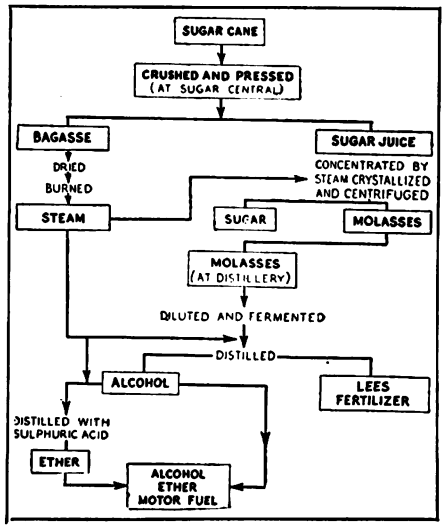


Diagram of the process of manufacture of alcohol-ether motor fuel from by-products of the sugar industry, prepared by D. H. I. Cole and published in *Automotive Industries.*

Gas Generator Operation. Triangular charts are used to indicate the processes that take place in the generation of gas in the gas producer. Three periods in the operation of the generator are described—drying, distillation period and gasification periods. Methods of regulation are developed from the data given on these charts. A. W. H. GRIEPE, *Amer. Gas J.,* 5-13-22, 6000 w. IG.

Gas-Fired Hot Water Systems. Gas installation shows saving of $62.75 per month in installation using 75,000 gallons per month. Comparison is made between different installations. A. A. SCHUETZ, *J. Am. Soc. Heating Ventilating,* 4-22, 1200 w. CJW.

Low Temperatures. Popular brief account of liquid gases and their behavior under various conditions. R. F. YATES, *Tycos; Power House,* 6-5-22, 1500 w. CJW.

Determination of Aromatic Hydrocarbons. New method of determining the benzol content in technical gases is based on absorptive powers of charcoal. Details of method are given. Comparison with other methods in common use indicated that the new method gave higher results, which were the more accurate, as the older ways did not absorb all the benzol in the gas, this being especially true when the percentage of the hydrocarbon in the gas was small. E. BERL, K. ANDRESS and W. MUELLER, *Amer. Gas J.,* 5-13-22, 1800 w. IG.

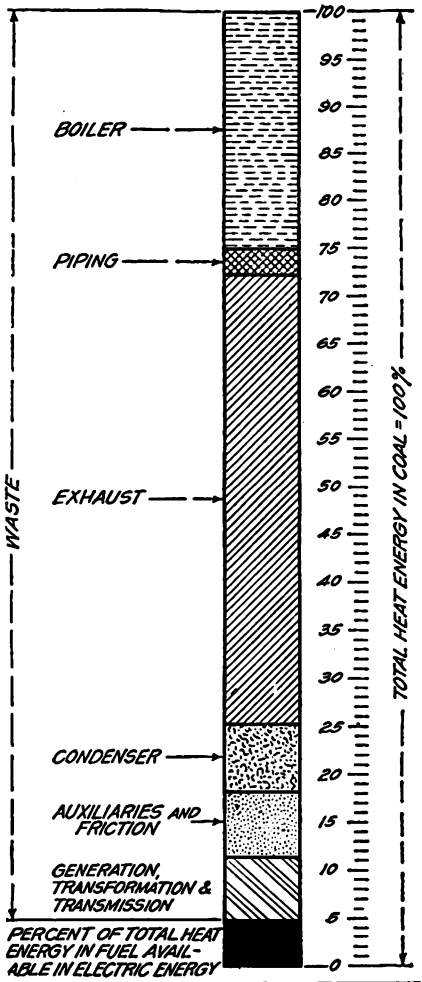
Fallacies of Heating. Heat alone, without changing air, cannot drive out or absorb moisture; it can only convert it into vapor, which remains where it was generated until carried away by current air. Gives application to drying out plaster. HENRY ADAMS, *National Builder,* 6-22, 1000 w. CS.

Handling of Natural Gasoline. The use of this new product in refining and producing motor fuel is discussed in detail. The method of opening the cars, gauging of the gasoline, sampling, unloading, pumping into cars, etc., are described. The precautions that must be taken are told. D. E. BUCHANAN, *The Oil Weekly,* 4-15-22, 5000 w. IG.

Mechanism of Coal Carbonization. Decomposition of coal substance to ordinary high-temperature tar when subjected to action of heat is process of progressive, step-by-step decomposition, in which pyrogenetic syntheses play only secondary part. Six-membered rings and combinations thereof characterize entire series of decomposition products from coal to high-temperature tar. Average molecular weight of liquid intermediate products constantly decrease as temperature of carbonization rises. This decrease is marked by evolution of hydrogen, methane, and ethane. Initial decomposition of low-temperature tar first formed is brought about by loss of hydrogen from portion of the naphthenes with resultant increase in proportion of unsaturated hydrocarbons; loss of sidechains from phenols by hydrogenation with resultant formation of lower-boiling phenols; and loss of hydrogen from nitrogen bases to form large proportion of tertiary compounds. (This stage represents Carbocoal tar.) Final decompositions are at maximum between 700° and 800° and are marked by dehydrogenation and dealkylation of hydroaromatic unsaturated hydrocarbons and nitrogen bases to form aromatics, with elimination of hydrogen, methane and other simple gases; hydrogenation of phenols to aromatic hydrocarbons and of these aromatic hydrocarbons to lower boiling aromatics, with formation of methane, ethane, and water; and secondary pyrogenetic syntheses of higher aromatics from simple compounds. The phenols of low temperature tar are the principal source of monocyclic aromatic hydrocarbons. The unsaturated naphthenes of low-temperature tar are principal source of polycyclic aromatic hydrocarbons. J. J. MORGAN and R. F. SOULE, *Chem. Met. Eng.*, 5-31-22, 4500 w. CJW.

Low Temperature Carbonization. Range of temperature lies between 550 and 800° C., all coals being amenable to efficient treatment within such limits. Critical stage from 700 to 800° C., when great care has to be exercised in heating so as to prevent exposure of distillate to these temperatures. This limitation is characteristic limitation of low temperature system of carbonization and has probably prevented commercial success of some proposed schemes. Discussion of best fuel for low temperature carbonization, difficulties of low temperature intumescence. Essential to combine rapid low heating and conservation of by-products. Key to problem in equilibration of these opposing factors. By presenting heat on one side of charge and passing heat there through transversely, simultaneously withdrawing distillate under suction, possible to affect any desired temperature drop across charge thickness by variation of thickness and temperature and heating control at flues. By placing zones of heating flues along height of retort and operating each stage or zone under separate heating conditions, readily possible to treat traveling charge in steps and thereby effectively realize possibilities of each phase of process. These principles claimed to be embodied in Davies system of low temperature carbonization. W. E. DAVIES, *Gas Age-Record*, 5-13-22, 2500 w. CJW.

Power Drills. Where car supply is adequate and men can load steadily, power drills increase output. Where coal is unusually hard good practice to use portable motor-generator set or motor-driven compressor. Their use gives greater energy and drilling speed is increased. Various types of drills illustrated by cuts. N. G. ALFORD, *Coal Age*, 5-18-22, 1200 w. CJW.



How Coal Is Wasted in Electric Power Generation.—*(Gas Age-Record.)*

Boiler Water. Four major factors affect priming. Relative importance are: Change of load, 70; load, 15; concentration, 10; height of water in glass, 5. With boiler water concentration at 30, load not in excess of 180% rating, with water level under half glass and boiler pressures held within 5 lbs. variation in 10-min. intervals, fairly dry steam may be obtained. Most serious trouble is blocking of feed lines. At least once a year, entire feed line must be removed and turbined out. Boiler scale must be watched. Attempts to obtain dry steam. C. E. JOOS and A. W. BINNS, *Power Plant Engineering*, 5-15-22, 1200 w. CJW.

Steam Waste in Heating Railroad Coaches. Review of development of present car-heating methods and economic value of thermostatic control. T. W. REYNOLDS, *Heating & Ventilating Mag.*, 5-22, 3000 w. CS.

Combustion Engines. General discussion of operations of starting up, shutting down and routine running of combustion engines. Should be of interest to people with little knowledge of engine operations. *Power Plant Engineering*, 5-15-22, 1400 w. CJW.

Economy of Damper Regulations. Explains use and value of automatically controlling rate of combustion in steam boilers by means of damper regulators. W. F. SCHAPHORST, *Sanitary & Heating Eng.*, 5-5-22, 1000 w. CS.

Savings about Furnaces. Suggestions for rapid and enduring furnace renewals. Radiating from furnace walls should be prevented. Because of shrinkage and inability to bond tightly, fireclay has been displaced to great extent by cements. Good cement will not fuse within range of temperature of boiler furnace. Various cements listed by manufacturers Tight baffles are indispensable for attainment of maximum efficiency with water-tube boilers. More heat can be abstracted from gases, as they move through various boiler passes to flue. Main purpose to cause heated gases to sweep over maximum area of tube surface. Monolithic baffle walls composed of cement, cast in forms, are advantageous. Walls in bad condition may be improved by plastering interior with firebrick substitutes. Most of air that leaks into boiler through walls, not being under control, lowers temperature of flue gases without in any way aiding in combustion. A. F. BROSKY, *Coal-Age*, 5-18-22, 2000 w. CJW.

Power Costs in Mining. Power costs at Kathleen Mine (Dowell, Ill.) are analyzed and costs of individual processes given. Reasonably steady run reduces cost of power by nearly half, figures varying from 6.43 to 13.36 cents per ton. Haulage is greatest power consuming process. Ventilating load is remarkably constant. Metering of mine makes it possible to ascertain where power purchased goes, necessary preliminary step that must be taken if power leaks are to be stopped. E. MCAULIFFE, *Coal Age*, 5-18-22, 1500 w. CJW.

Electrical Gate Valves. General discussion of power operated valves and of Dean valve in particular. Dean system of valve control has six particular features: Single unit system, can be attached to existing valves with a minimum of effort and without shutting down line; positive in operation and does not depend upon momentum or drift of moving parts to seat; has ample seating and unseating torque; whole unit is enclosed and waterproof and gas tight; applicable to 220 volts 25, 40 or 60 cycle single phase alternating current, also 110 or 220 volts direct current. Control of valve is by means of one standard control station for one or more points. 16 suggested gas industry applications are given. C. E. REESE, *Gas Age-Record*, 5-20-22, 2000 w. CJW.

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IRON·STEEL

Electric Furnace Steel from Pacific Coast

STEEL products "made in California" may some time lead the world, says a writer in the *Journal of Electricity and Western Industry*. Due to the superabundance of hydro-electric energy, the entire Pacific Coast offers great possibilities to the steel industry of the future. Perhaps the most important effect of the use of the electric furnace will be that of building up the iron and steel industry on a quality basis. For, although this furnace cannot compete on a strict tonnage basis with either the cupola or open hearth, its superiority is evident when the question of quality comes into play.

Just what quality production will mean to the steel industry may be realized when the reason for the extensive use of Swedish iron is taken into consideration. Because of its reputation for excellence as being the base of all Sheffield tool steels, Swedish iron has been preferred by manufacturers of fine products. But today there are shops in this country making products as fine as the Sheffield tools from iron which has been refined in the electric furnace and from which phosphorus and sulphur have been eliminated to the same degree as in the best Swedish iron.

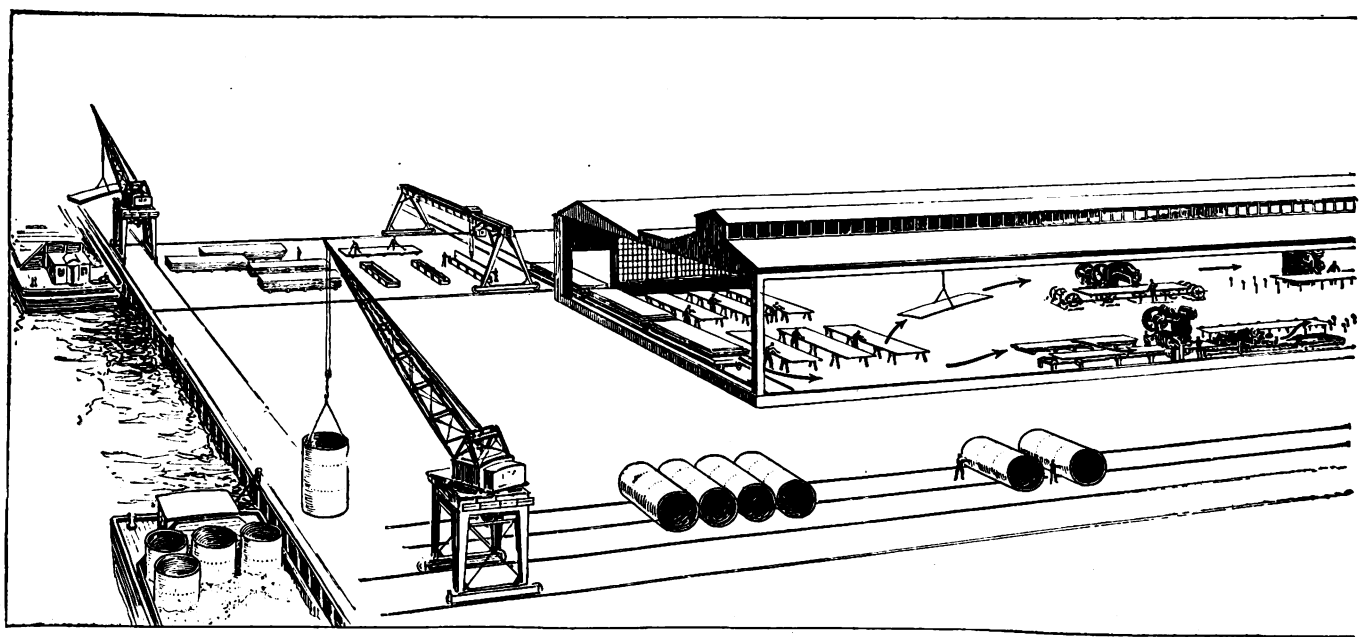
As a result of the development of electric steel, steel castings, iron castings, high-grade forging ingots, alloy steels, special iron castings for electrical and heat-resistant use, corrosion-proof castings, etc., can be successfully produced at a cost that will enable the American manufacturer to meet foreign competition.

Melting Cast Iron. Discussion of Booth rotating electric furnace, including refractories, electrodes, power, rotation, charging, slagging, temperature control, pouring and metal losses. Analyses are given which show effect of melting on chemical composition. Comparative physical tests are given of heats of cast iron made from borings, pig and back scrap, and all back scrap. Effect of steel and alloy additions on the physical properties are shown in tests of several typical heats. H. M. WILLIAMS and T. B. TERRY, *Trans. Am. Electrochem. Soc.*, 1922, 10 pp. CJW.

Synthetic Cast Iron. Scant literature of electric furnace cast iron is reviewed, showing that duplexing process probably first was used on commercial scale in foundry in Cincinnati, O. Conditions favorable to electric furnace for cast iron are discussed and preference expressed for duplex process with basic-hearth electric furnace. Desulfurization and deoxidization in electric furnace are described. Problems involving sulfur, oxygen and other gases and impurities —all brought up by electric furnace practice—are discussed and several lines of investigations suggested. G. K. ELLIOTT, *Trans. Am. Electrochem. Soc.*, 1922, 13 pp. CJW.

Cast Iron from the Electric Furnace. History of electric iron. The possibilities of this process especially in refining the metal; desulfurization and deoxidation. The outstanding advantage of the electric furnace is the fluidity of the charge, which means solid castings. GEORGE K. ELLIOTT, *Iron Age*, 5-4-22, 2500 w. APS.

Synthetic and Electric Iron. Low phosphorus pig-iron scrap steel is synthetic pig iron, from ores is electric iron. Expects electric furnace to become adjunct of the foundry and to use steel turnings as raw material. Open-top and shaft furnaces have been used. Discusses possibilities of economically manufacturing electric iron from ores. ROBERT TURNBULL, *Iron Age*, 5-4-22. APS.



A Comprehensive View of the Layout for the Fabrication of Large

The adoption of the facilities and equipment of a shipyard for general engineering purposes affords a striking illustration of the part shipyard machinery now plays in industrial progress. With the employment of modern machinery and the use of up-to-date methods, progressive industrial management holds the secret of efficient and low-cost production. The story of the fabrication of large-diameter riveted steel pipe for use in the Catskill Aqueduct, for the Board of Water Supply of New York City, demonstrates how this combination is being efficiently effected. The accompanying illustrations portray the

Corrosion of Iron. Danger in corrosion of holder plates by electrolysis, due to impurities in iron, is increased, due to fact that they are alternately wet and dry. Correction is possible only before holder is built, that is, pure iron must be used. Initial rust film formed on commercially pure iron is uniformly tight and close adhering, thereby retarding corrosion and eliminating pitting danger. D. M. STRICKLAND, *Gas Age Record*, 5-20-22, 1000 w. CJW.

Heating and Cooling Steel. Brings out facts that uniformly heated steel requires more than a uniformly heated furnace and a "good" pyrometer record; that human element is very important and that care must be taken to insure proper thermal expansion and contraction by proper loading at low temperature and slow firing. JOHN A. SUCCOP, *Amer. Soc. for Steel Treating*, 5-22, 2500 w. APS.

Abrasive Qualities of Steels. Tests made on machine which is diagrammed and described. Low carbon plain steel and chrome nickel low and medium carbon steels were tested in the form of rollers after heat treatment. The greater the density and hardness, the greater the abrasive resistance. Tension and Brinell tests are not reliable index to abrasive qualities. Carbon steels showed more uniform results and less wear loss than chrome-nickel steels. A. M. COX, *Amer. Soc. for Steel Treating*, 5-22, 4000 w. 12 Figs. APS.

Impact Testing Methods and Results. Impact testing machines are of numerous types. Only four, Fremont, Charpy, Izod and Stanton, are reviewed. Specifications of test specimens and arrangement of testing machines. Numerous tables, figures and photographs of impact fractures on various types of steel. Concludes that impact test is very sensitive and shows up characteristics of steels not brought out by other mechanical tests. JOHN M. LESSELLS, *Amer. Soc. for Steel Treating*, 5-22, 7000 w., 22 Figs. APS.

Heat Treatment and Magnetic Properties of Steel. Measured intensity of magnetization and coercive force. Saturation intensity is unaffected by heat treatment, but coercive force declines as hardening strains are removed and more so as grain growth commences. LANCELOT W. WILD, *Amer. Soc. for Steel Treating*, 5-22, 4000 w. APS.

Acid Open Hearth Process for Gun Steel and Fine Steel. Part 3 of detailed description, covering prevention of transverse cracks, octagonal and square molds, hot top and discard, top and bottom pouring. W. P. BARBA and HENRY M. HOWE, *Blast Furnace & Steel Plant*, 5-22, 2500 w. APS.

Tropenas Converter for Steel. A blowing process, but more suitable for small heats than bessemer process. The cupola charge. Details of working the converter. Acid lining so low phosphorus and sulfur charge must be used. Details for converter. S. R. ROBINSON, *Blast Furnace & Steel Plant*, 5-22, 2200 w. APS.

Effect of Quality of Steel on Case-Carburizing Results. Usual assumption that chemical specifications are sufficient for steel to be used for case carburizing is not borne out by facts. Structure of case before and after quenching is affected by actual condition of steel itself as made. Excess of dissolved oxides in steel as made in melting furnace affects permanently the results obtained in carburizing and hardening. 23 figures. H. W. MCQUAID and E. H. EHN, *Forging & Heat Treating*, 5-22, 3000 w. APS.

Heat Treating Costs. Interest, taxes, depreciation and repairs, land and building charge, equipment, indirect labor, supplies, power and fuel, general factory burden, miscellaneous charges; form of labor ticket, non-productive labor ticket, lost time and allowance ticket, etc. HAROLD F. WOOD, *Amer. Soc. for Steel Treating*, 5-22, 4000 w. APS.

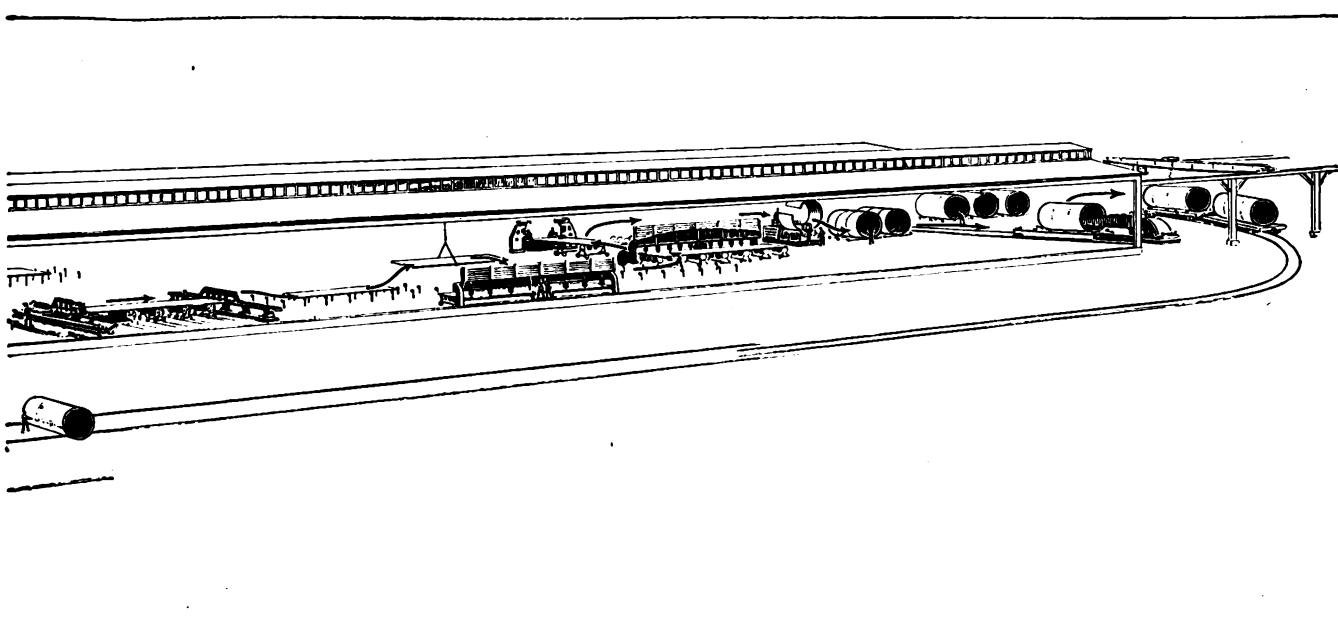
Methods Used in Specialized Production of Cast-Iron Pistons. In the manufacture of cast-iron pistons in large quantities, the machine tools are fairly simple, and to a certain extent standard. There is, however, opportunity for the exercise of much ingenuity in working out equipment, fixtures, jigs, etc., which will permit of cutting down idle time, increasing the output, permitting the use of cheaper labor, or otherwise helping to cut down costs. This author describes the methods of the Foster Machine Co. with a light-weight piston which is a large seller for replacements. Both foundry and machine shop equipment is mentioned and illustrated. J. EDWARD SCHIPPER, *Automotive Industries*, 4-27-22, 1700 w. MAH.

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Diameter Steel Pipe for Use in the Catskill Aqueduct, New York

various stages of fabrication. Ten thousand tons of steel enter into the fabrication of this riveted steel pipe line, which, when laid down, will extend six and one-half miles from Cold Spring to the Harlem River tunnel, near Pleasantville, N. Y. The diameter of the pipe varies from 7¼ feet to 8½ feet in diameter and is made in 22½-foot sections. The process of the fabrication of the pipe line is perhaps the most modern in the records of general engineering methods, and has attracted the attention of engineers in foreign countries as well as construction engineers of all kinds in the United States.—*(Chester Compass.)*

MINING

Economy in Copper Production

ANOTHER example of the elimination of waste in industry is furnished in the recent production of copper sheeting from leach solution at one of the large copper plants in the Southwest. As a result of this close cooperation between mining and manufacturing processes important savings are effected in time, overhead, labor and transportation charges.

For the purpose of producing the sheeting, a revolving drum is employed somewhat similar in appearance to an Oliver filter, the bottom of which dips in the high copper solution from the leaching vats. Cord is wound spirally on the surface of this drum, after which the surface is coated with a solution of sodium sulfide. Current is then applied from an electrode in the bath and travels through the solution to the surface of the revolving drum on which copper is deposited. This is wound off on spools, washed, passed through machines and pressed into shapes, which are afterward soldered together to form radiators for automobiles. *The Engineering and Mining Journal* points out that a number of other all-copper articles might successfully be made in a similar manner.

New Nickel-Copper Deposits. This deposit has been discovered near Shebandowan Lake, Canada. Essentially pyrites, contains nickel as polydymite and copper as chalcopyrite, while the platinum group was present at rate of 0.16 oz. per ton. Considerable exploration work will have to be carried on before commercial possibilities are known. J. G. Cross, *Canadian Mining Jour.*, 5-5-22, 1500 w. CJW.

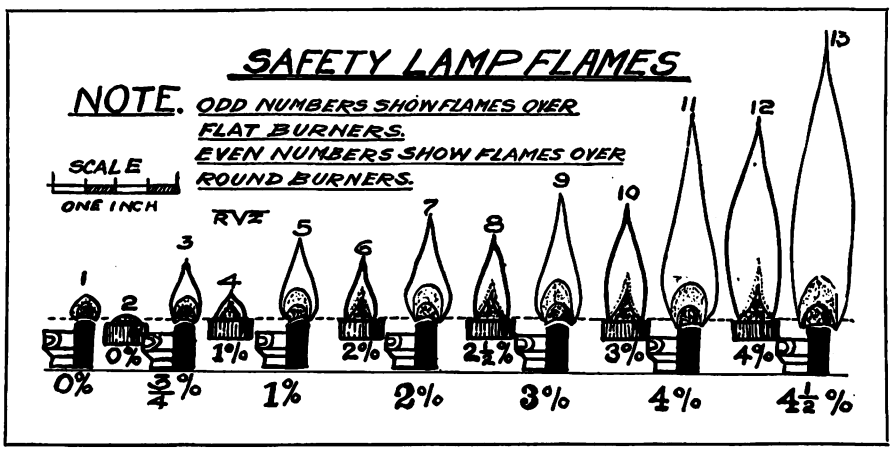
Globe-Miami District, Arizona. General discussion of this district, with data on its geology and the various copper-mining companies in operation. The district furnishes 10% of copper mined in U. S., and 6% of that of world. Possible life of district is at least 15 years and probably much longer. Some silver and gold also mined. *Arizona Mining Jour.*, 5-1-22, 88 pages. CJW.

Gold in Canada. Prophecies about gold production in Canada are injudicious. Increased capacity is planned at Porcupine. Conviction prevails that widespread distribution of gold throughout northern Ontario will afford enough meritorious properties to broaden movement throughout district. Cheap hydroelectric power is indispensable to those who would hasten development. Custom smelters needed. Elbow Lake now in limelight. Other promising districts. A. Gray, *Eng. Min. J.-Press*, 4-8-22, 1500 w. CJW.

Cost of Milling and Treating Ores. Tables of itemized costs are given, together with results of operations of individual plants. Calculated in value of metal extracted rather than in assays of mill feed. Breaking, 7 to 13 cents per ton of mill feed. Secondary crushing, 10 to 20 cents. Grinding, 10 to 20 cents, to give product of which 15% to 50% passes a 200-mesh screen. Sliming, 15 to 50 cents, reduces a feed all of which passes a 10- to 20-mesh screen and gives product of which 90% 200-mesh screen. Cost of crushing to slime, for each percentage of product that will pass 200-mesh screen, per ton of run-of-mine ore, ¾ to 1.5 cents. *Eng. Min. J-Press*, 5-27-22, 2000 w. CJW.

Strip-Pit Economics. Stine Coal Co., Bear Run, Pa., is stripping large area (about 250 acres at present completed) of coal, thus making it ready to be loaded and shipped when market conditions warrant. Stripping is safe means of storing coal ready for quick shipment. "Carrying charge" comparatively small and risk from spontaneous combustion slight. Greatest depth of overburden is 40 ft., and average is 20-25 ft., of which 10 ft. is shale and 10 ft. thinly laminated sandstone, covered with clay and alluvium; 340-ton shovel, with 80 ft. boom and 6 cu. yd. dipper, used for stripping. Coal loaded out with smaller shovels. Water problem also important. Boiler feed pipe lines are leveled with transit to avoid trouble from frost. Haulage and shooting methods are discussed. A. F. Brosky, *Coal Age*, 5-11-22, 2500 w. CJW.

Miners' Safety Lamp. Three general methods used for testing for gas in mines: Use of normal flame, use of short or immediate flame about length of normal lighting flame, and by use of "cap" flame, blue in color. "Cap" flame detects presence of more than 1% of gas under all ordinary conditions. Special precautions to be used in connection with safety lamps are: Lamp to be locked before entering mine; examine carefully, even if passed by inspector; carry no key or other unlocking device; use great care in assembling lamp; lamps must be opened only at regular lamp stations; do not set lamp on bottom of mine; use no lamp with dirt or oil on gauze; do not allow flame to smoke. Other precautions in Miner Circular 12, Bureau of Mines. *Coal Trade Bul.*, 5-1-22, 1500 w. CJW.



Methane gas caps, showing relative sizes. See "Miners' Safety Lamp" digest.

Singing Safety. Germans have perfected lamp to serve as warning for miners already provided with electric lamp, but who cannot determine with it character of air in which they are enveloped. Signal is audible and therefore more likely to be heeded. Based on principle that flame burning in interior of glass tube under certain conditions will give sound audible to ear. First sound when air contains 2% of methane; loudness will increase till percentage of methane is 4; with more than 5% or 6% of methane flame will go out. A. Gradenwitz, *Coal Age*, 5-4-22, 400 w. CJW.

Flame Safety Lamp. General discussion of gauze requirements for safety lamps, and tests which showed that for high temperature, steel proved superior to either brass or copper, though at low temperature the advantage is small. Single gauze bonneted lamp is safer than either type of unbonneted lamp, omission of a gauze being more than offset by bonnet. Double gauze bonneted lamp safest. Description of two most important lamps, Koehler and Wolf. R. Z. Virgin, *Coal Trade Bul.*, 5-16-22, 2000 w. CJW.

Progress in Mining Machinery. Two general types of coal-mining machines are: puncher and chain cutter. Of chain cutters there are three types: breast, continuous undercutter, either longwall or short wall, and center cutter, including top cutter. Three others used somewhat are Hess dustless machine, Jeffrey heading machine and Oldroyd machine. Operation of these types described and illustrated. Power requirements shown

by means of curves. Attitude of unions opposed to adoption of modern machinery. *Coal Age*, 5-18-22, 3500 w. CJW.

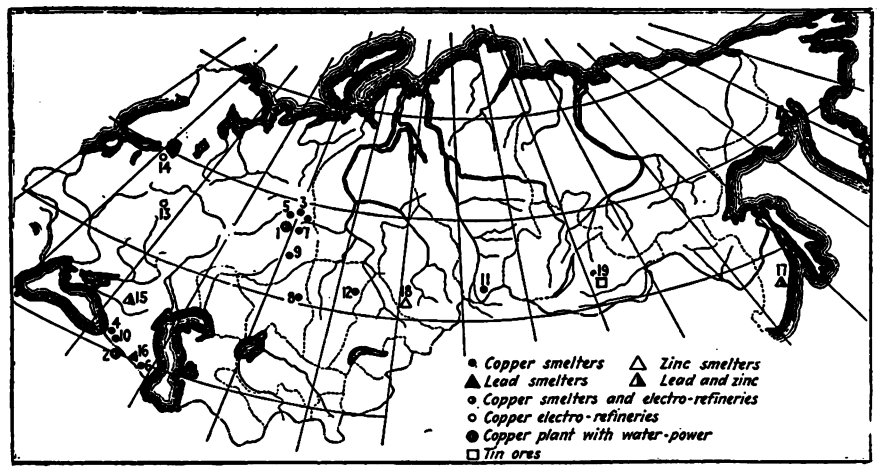
Shoveling Machines. Discussion of various types of shovels and their application to coal industry. Factors militating against their use are difficulties with labor and lack of sufficient and efficient superintendence. Machine having large capacity must have continuous supply of cars. First large cost and idle time are arguments against large shovels. Loaders that are not shovels but mere loaders which themselves have to be loaded, but, being loaded, will raise coal, transfer it and drop it into car, seem to have reason for being which their lower speed of operation and imperfect service would seem to deny them. They are more flexible and can be used where roof is not particularly good and coal is thin. Handling of cars should be carefully planned so that tracklaying, timbering, etc., is not done by loading crew. *Coal Age*, 5-18-22, 4000 w. CJW.

Katathermometer. Preliminary study, in connection with mine dust and ventilation investigation indicates that instrument will probably be useful for making routine determinations of comfort conditions in mines and that it may also prove useful as important accessory for investigative work on problems in ventilation and kindred subjects in both coal and metal mines. Instrument measures its own rate of cooling when its temperature approximates that of human body and thus serves as index of rate of cooling of body itself, which is said to be controlling factor in determining comfort or discomfort. *Bureau of Mines*, Investigation No. 2355. CJW.

Mine Locomotives. Tension of trolley should be noted, socket kept lubricated and tension spring adjusted as necessary. Recommended pressure of controller fingers should be maintained as closely as possible. Should be lubricated with vaseline but not used in excess. Arc barriers should be cleaned to maintain insulation necessary. Wood of drum should be kept clean and periodically resurfaced with shellac or nonconducting paint. Frequent inspection desirable. H. H. JOHNSON, *Coal Age*, 6-8-22, 1200 w. CJW.

Mechanical Loading in Metal Mines. Need of some sort of standardization apparent but progress has not reached stage sufficiently advanced to require more than very general standards. Two sets of conditions where results expected are radically different: Where speed is first requisite with costs secondary and where cost per ton receives first consideration. Results of questionnaires to representative mining companies discussed. Greatest differences reported were in sizes of cars serving loaders and in gauge of tracks. Standard sizes of pipe-fittings and connections, bolts, etc., have been secured to some extent. Certain standards of personnel, such as size of crews, also need attention. L. EATON, *Arizona Mining Jour.*, 6-1-22, 1000 w. CJW.

Incline Slicing Method. Description of method as adopted in mines of Morenci, Ariz., district. Tons per man increased over figures obtained by flat slicing system (from 5.4 to 8.8) and costs show decrease of 15% in favor of incline method of stopping. Timber consumption slightly higher (9 as compared with 7.9 board ft. per ton). Method shown in three diagrams. J. P. HODGSON and J. KIDDIE, *Eng. Min. J.-Press*, 5-27-22, 1000 w. CJW.



Location of copper, lead, zinc, and tin smelters of Russia, arranged according to metals smelted, and size.—*(Eng. & Mining J. Press.)*

1. Karabash smelter (Kyshtim district). Dressed ores. Water power. Own cheap coal. High-priced custom coke. Efficient labor.
2. Alla-Verdi smelter. (Sangezur district). Dressed ores. Water power. Expensive coke. Oil fuel cheap. Persian labor of low efficiency.
3. Bogoslovsky smelter. (Bogoslovsky district). Undressed ores. High-priced coke. Cheap coal. Good labor.
4. Dzansoulsky smelter. (Batum district). Dressed ores. Expensive coke. Oil fuel. Labor not efficient.
5. Vyisky smelter. (Vyisky district). Undressed ores. Expensive coke. Peat and wood fuel. Efficient labor.
6. Kedabeg smelter. (Elisavetpolsky district). Undressed ores. Oil fuel. Expensive coke. Inefficient labor.
7. Kalatinsky smelter. (Verkh-Isetsky district). Being enlarged.
8. Spassky smelter. (Spassky district). Flotation plant. Being enlarged.
9. Tanalyksky smelter. Small production. Capital lacking. Copper ores contain high gold content.
10. Kvarzkhana smelter. (Batum district). Under construction.
11. Eniseisky smelter. (Minusinsky district). Undressed malachite ores. Cheap wood fuel and charcoal.
12. Pavlodarsky smelter. (Pavlodarsky district). Shut down.
13. Electrolytic refinery of Moscow (formerly Vogau). Custom high-grade copper. Oil and peat fuel.
14. Electrolytic refinery of Rosenkranz. (Petrograd). Custom high-grade copper. Imported coal. Oil fuel.
15. Alagir smelter. (Zinc and lead).
16. Alikent smelter. (Lead only). Inactive.
17. Ore dressing plant only. Lead and zinc ores of the Primorsky district.
18. Ekibastus zinc and smelter. (Ridderaky district). Under construction.
19. Tin ores of Onon.

Refinery Practice in Smelting Cyanide Precipitate. Practice at Buckhorn, Nev. The filter cake, briquetted with litharge and suitable fluxes (soda ash, borax glass) smelted in small blast furnaces with coke and old slag. The resulting bullion is cupelled. Flue losses were found to be small as were fume losses in cupellation. E. R. RICHARDS, *Eng. & Min. Jour.-Press*, 5-20-22, 1700 w. APS.

Heap Leaching of Low-Grade Copper Ores. This process economical in double sense: cost of treatment and recovery extremely low, and method is applicable to ores too low in copper for ordinary smelting or milling. First used in Spain and for 20 years in Australia. Lately introduced in Bisbee district. Ore crushed to 10 mesh and assaying 2% copper, using solution containing 2% iron, gave, by percolation only, an extraction of 50% in 58 days. Various experimental results reported. Large scale test, with 300,000 tons of ore, now under way. Process needs control, leaching solutions should be distributed carefully, so that washing and percolation are always under control. Treatment of heap will continue for 3 to 5 years, depending on various conditions, chemical and mechanical. As a rule, profitable extraction should be complete within 5 years. *(To be concluded.)* *Eng. & Mining J. Press*, 4-29-22, 4500 w. CJW.

Slope Accidents. More men are killed and injured by haulage ropes on slopes than any other way in same portion of mines. Other causes of accidents are: By or on cars (struck by cars, riding on cars), hoisting machinery and falling down slopes. Many could be avoided by few simple safety rules, main one being "Don't take chances." Keep off slope haulageways. Keep away from ropes, sheaves, drums, etc., even when they are not in motion. Don't try to jump on moving trips, don't ride on front end of trip or between cars, keep as low in car as possible, don't get off cars while in motion. Don't try to coast down slope in car which is not hitched to hoisting rope. Always keep safety-block in position to protect slope, except when cars must pass it. R. H. KUDLICH, *Coal Industry*, 4-22, 1000 w. CJW.

Uses of Concrete in Mines. Covers uses for shaft linings, shaft timbers, gallery linings, bulkheads and stoppings, shops, track ties. ANTON S. ROSING, *Canadian Mining Jour.*, 5-26-22, 3500 w. CS.

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New Uses for Unbreakable Glass

THE development of unbreakable glass, termed "bullet proof or non-shatterable glass," is likely to prove of great value to industry. The *National Glass Budget* reports that it is now being introduced in over 100 different industries.

In automobile windshields and in the enclosing of automobiles, bullet-proof glass will be particularly useful, for not only does the breakage of windshields result in considerable loss to the owners, but statistics show that 53% of the injuries due to automobile accidents come from flying glass. Instrument manufacturers are also said to have found the new glass to be satisfactory as covers of delicate instruments; and it is said to be especially adaptable to welders' goggles and for various other safety equipment.

As a protective measure for their employees and capital, many banks are having cages enclosed with bullet-proof glass, as it will resist the impact of a .45-calibre bullet fired at close range and will permit attaches to reach points of alarm in cases of attempted robbery.

Glass Making. Interesting and illustrated article on history of manufacture of glass in U. S. Reasons for adding lime, lead, etc. A. W. BITTING, *Pacific Drug Review*, 5-22, 1200 w. CJW.

Pyrex. Discussion of development of work of Corning Glass Works in producing glass of low linear expansion in such way that melting and working qualities of glass would not be affected. Not substitute for Jena and other foreign glass but better than these. Glass bakes food more rapidly and thoroughly than ordinary utensils of metal, due to greater reflectivity of metal for radiant energy. Some of its uses are: Cooking utensils, oven door panels, percolator tops, gage glasses, cylinders, tubing, laboratory apparatus, battery jars, lantern globes, chimneys, condenser lenses and headlight glasses. W. H. CURTISS, *Glass Industry*, 6-22, 1400 w. CJW.

Analysis of Optical Glasses. General details, reference being made to former articles for most of detail. J. B. KRAK, *Glass Industry*, 6-22, 500 w. CJW.

Reflecting Telescope Disks. These may be made by casting glass into suitable mold and annealing. Annealing schedules of Adams and Williamson have been found to be satisfactory. Electric or gas-fired furnaces may be used for obtaining uniform temperature necessary, but gas furnace has been found to be more reliable. Special equipment is required for obtaining accurate cooling rates and Leeds and Northrup electrical control and Robertshaw gas regulator are suitable when slightly modified. If reflector disks are made of low expansion glass change of figure in parabolic mirror due to change of temperature can be minimized. D. E. SHARP and W. H. RISING, *J. Ind. Eng. Chem.*, 6-22, 5000 w. CJW.

Stained Glass. The first of several articles on how windows of stained and painted glass are made today by craftsmen. JOSEPH G. REYNOLDS, JR., *American Architect*, 5-24-22, 3000 w. EMcC.

Stained Glass. The historical period. Second of a series of articles by a craftsman. This is a history of colored glass making from the 11th to 16th centuries, with illustrations. JOSEPH G. REYNOLDS, *Amer. Architect*, 6-7-22, 3000 w. EMcC.

Heat Balance for Glass Tank. Proper design of glass furnace necessities calculation of amount of heat needed to melt and fine desired quantity of glass in shortest time consistent with economy and quality of finished product. Efficiency of even most modern and best built furnaces is not much over 10%. Important to know how great percentage of heat is needed for production of glass, how much to heat tank blocks or pots and how much is lost or wasted. Series of calculations given in present article to furnish such data. First installment covers efficiency of producer, line losses, composition of batch and amount of glass made in 24 hrs. F. J. DENK, *Glass Industry*, 6-22, 2000 w. CJW.

Gas Producers. In hand firing, charging should be divided through even periods and only one producer at time dumped. Air portion of producer gas (that produced by complete combustion of carbon on bottom layers of fuel bed) is most important factor in production of economical producer gas. In production of water gas portion of producer gas necessary to keep coke very hot. Done in producer by continuous combustion of lower fuel layers of producer by oxygen of air. Expensive and very little attention given to it. Less steam can be used, using low pressure or waste steam, by keeping soft and even ash bed. Automatic or semi-automatic machines eliminate many of disadvantages. Continuous changing of gas composition and varying rates of flow have deleterious effect upon both pot and tank furnaces. Steady fuel supply which produces combustion which fills furnace with clear bright flame is recommended. Good technical control is essential. H. W. HESS, *Glass Worker*, 5-27, 6-3-22, 2000 w. CJW.

Removal of Dust from Producer Gas. Dust varies from 2 to 18 grams per cubic meter of gas. Cleaning of gas usually accomplished by diminishing speed of gas through enlargements of gas flues into dust chambers and through changes in direction of flow of gas. Description of new system, based on Cottrell's patents in America and Moeller's patents in Germany. Efficiency is 99%. Handling of machinery very simple because parts highly charged are not accessible and also because of low amount of current. Power requirements amount to few kilowatts and might be generated by waste heat. *Glass Industry*, 6-22, 500 w. CJW.

Scope of Magnetic Separation in Glass Plants. Process has two main applications: use of magnetic pulleys as head pulley for conveyor belts, and self-contained separators. Latter can be portable outfits. Magnetic pulleys operated by 110 or 220 volts, DC current. Application of higher intensity separators for removing iron from glass sands presents a highly specialized problem. Iron leaves specks in glass or if finely divided causes the green color noticeable at edge of fractured pieces of thick glass. Method of installing pulley is described. R. A. MANEGOLD, *Glass Worker*, 4-22. AMC.

Amsler-Morton High-Duty Port. Heat transfer affected by conduction, convectional radiation. Conductivity of glass almost zero. Correction of little use. In tank furnaces heat is applied from above. In case of melting in pots correction is of assistance but not until after glass is fluid. Ebullition due to formation of gases from its chemical reactions also assists in a pot. Usual "seed trouble" due to the inclusion of these gas particles in the glass as it is drawn downward toward the throat faster than the gas will rise through comparatively viscous molten glass. On the other hand radiation accounts for the greatest amount of heat transferred to the glass from the flame in the furnace. In a tank furnace heat transferred from the flame to the bath by radiation. *Glass Worker*, 5-15-22. AMC.

Pyrometers in Glass Plants. While use of pyrometers has become almost universal in glass plants, author doubts if users get full value from readings, methods of setting up and establishing proper control. Article deals mostly with high temperature couple control. Some special precautions required to maintain absolute temperature regulation from day to day. HENRY W. HESS, *Glass Worker*, 6-10-22, 1500 w. WRB.

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Advisable to Buy Copper Products Now

BECAUSE it is believed that the bottom has been reached in the prices of unwrought copper, the buying of finished copper and brass products in May was stimulated to such a degree that the consuming industry as a whole is reported to have increased its active plant capacity from 20% to 15%.

Automobile manufacturers were among the most active buyers of brass products, including feed-pipe, tubing, mountings and cylinders. Although earlier in the year most of the automotive makers had considerable supplies of brass and copper, these have now been reduced to a low point. According to the *Steel and Metal Digest*, a number of large orders have been placed and prompt delivery requested. In the Lake territory rolling mills and foundries are reported to have been running close to capacity, with orders on hand sufficient to keep the mills active from 60 to 90 days.

Quite a revival is being experienced in the demand for brass valves for both domestic and foreign shipment. This demand was active enough to absorb considerable stock accumulated during the dull period. April business was greatly in excess of March, and May showed improvement over April.

Monel Metal, a Natural Nonferrous Alloy. This unusual metal has many remarkable properties, and wider knowledge of these would bring about a greater use of it. It is a natural alloy, the ore as dug in Canada containing nearly 65% copper, about 30% nickel, slightly more than 1% iron and the balance other metals. As a foundry proposition it is difficult to handle, because it will not flow readily, and this difficulty cannot be overcome by extra heating, because it is hot-short. It chills quickly, and has other drawbacks. The metal produced, however, is a clean whitish gray, not unlike aluminum. It takes a high polish and holds it almost indefinitely, as it will not tarnish. It is very hard and can be finished as finely as desired. It will not rust and is not effected by water or moisture. It is practically acid and alkali proof, and since it is very dense, can be used in situations where corrosive liquids under pressure must be resisted. This article, the conclusion of a series, describes the Monel Metal Prod. Co. own shop methods. MORRIS A. HALL, *Brass World*, 4-22, 2875 w. MAH.

Platinum Substitutes. Gives properties of platinum making it valuable in jewelry and industry. The sources of platinum and the methods of mining and concentrating. Discusion of world's reserves of platinum. Present annual consumption exceeds the supply. Fluctuations in price. Substitutes are "palau," gold and palladium alloy, which resists many chemical reagents as well as platinum does, and "rhotanium," which is a substitute for platinum in electrical heating units. White gold is an alloy of gold with metals allied to platinum. For technical purposes a nickel-chromium-tungsten alloy (relay contacts and dentistry) and a silver-palladium-cobalt alloy (electrical) have been used. *Pacific Ports*, June 1922, 1200 w. APS.

Hot-Pressed or Forged Brass. Advantages of the percussion power press using hot metal blanks to produce a homogeneous full forging. Variety of products made from brass. Nickel, copper, tin, etc. are handled cold successfully. L. S. LOVE, *Iron Age*, 6-8-22, 1800 w. APS.

Properties of Metals and Alloys at Low Temperatures. Various metals as used commercially were tested for hardness and resilience at -20, -80 and -120 deg. Generally speaking the hardness increased as a result of cooling, but the resilience became less. The exceptions to the latter were mainly among the ferro-nickels, and the aluminum alloys. *Aviation*, 5-1-22, 500 w. MAH

Welding Duralumin. Up to now, the welding of this alloy of aluminum has been considered impracticable, but its wide use in aircraft has forced investigation leading to the welding of the material. The author, metallurgist with the Naval Aircraft Factory, tells of this experimental work, the methods employed, results obtained, conclusions to be drawn from it. As a conclusion, he says: "It seems practicable to apply welding in the fabrication of duralumin, provided (a) care is taken in design to facilitate welding, to avoid difficult and complicated joints, and to take care of expansion strains, and (b) provision is made for heat treating the entire part after welding, or for protecting it from exposure to moisture." HORACE C. KNERR, *Automotive Industries*, 5-4-22, 5400 w. MAH.

Dependability of Cast Iron Welding. Almost perfect results can be obtained if the casting properly repaired for welding by preheating and annealing. Typical examples of difficult problems in welding castings have been successfully solved by proper heat treatment. Eight figures. G. O. CARTER, *Acetylene J.*, 5-22, 2500 w. APS.

History of the Wire Drawing Industry. Wire drawing (as distinct from wire manufacture in general) is 1000 years old. The development of the industry with copies of old prints, etc., from the earliest date to the most modern equipment. Very interesting and readable history. Twenty Figs. KENNETH B. LEWIS, *Raw Material*, 5-22, 7000 w. APS.

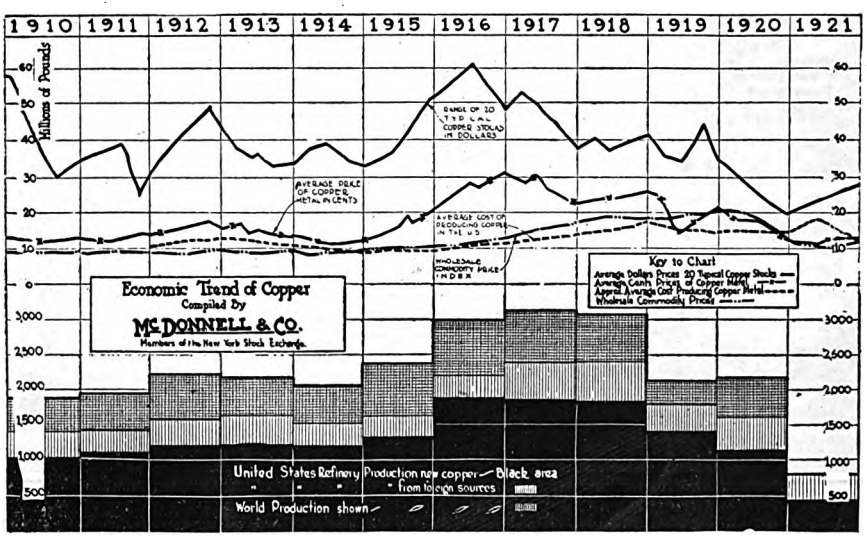
Metal Spraying for Rust Resistance. Schoop process coats metallic and nonmetallic objects with an adhesive coherent continuous coat. Description of apparatus and its action. Coated objects can be rolled, stamped, pressed, drawn, etc., without coating separating. Any metal can be used as coating metal. *Raw Material*, 5-22, 1800 w. APS.

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The Trend of Copper Production and Prices, 1910-1921.

MACHINERY

Better Outlook for Machine Tools

ACCORDING to *Machinery,* definite improvement has taken place in the machine-tool industry. Many of the shops entirely closed during part of last year are operating and some of the larger plants that have been running on extremely conservative schedules have put on increased forces. The activities in the radio field have affected the sale of small automatic screw machines to a considerable degree; and while most of the work in the tool shops comes from the automobile plants, some die work has also been placed by the radio instrument shops.

A growing appreciation of the work of the shops specializing in tool design and construction is indicated by the increased buying of tool equipment from such shops by manufacturers who used to do their own tool work.

An encouraging feature of the increased demand is that although much of the buying is done on a price basis, there are buyers who continue to insist on quality in workmanship and materials. It is believed that as soon as business in general becomes more active higher prices will be paid. In this respect it is probable that the machine-tool business will follow the procedure in the iron and steel business where prices came down to a low level some months ago, but have since stiffened and have stabilized at a higher level than that to which they first receded.

Planning in Large Contract Plants. This is another instalment in this series. Article discusses installation of planning department, proper personnel, functionalizing, planning and dispatching, concentrating and centralizing the planning, decentralization and the extent of this, transportation within plant, storage of equipment and large numbers of parts, and similar topics. GEORGE H. SHEPARD, *Machinery,* 5-22, 4400 w. MAH.

Standardization of Jig and Fixture Design. Many of the parts entering into the construction of jigs and fixtures are so very similar from one job to another that they can readily be standardized, with a subsequent large saving of time and money. Special reference is had to shoulder screws, fixtures, keys, knobs, shoulder drill bushings, binder handles, eccentric type clamping handles, cranks, bases, and other parts. Drawings and dimensions. *Machinery,* 4-22, 1700 w. MAH.

Keeping Lathe in Serviceable Condition. Lathe is still the premier machine tool, especially for small shops, but to be usable it must be kept in good condition. Accurate alignment is necessary, absence of vibration, rigidity of parts, equalized tool pressures, elimination of wind from the bed, accurate center bearing or the spindle, accurate alignment of the spindle, and other small points. All of these must be watched, the author points out, to produce satisfactory, accurate work. H. ALTON, *Can. Machinery,* 4-6-22, 3900 w. MAH.

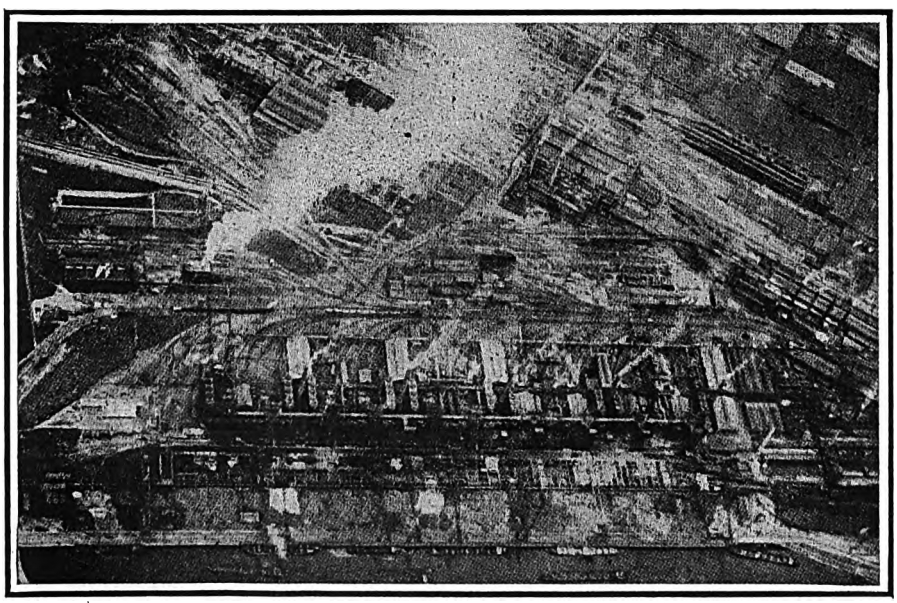
Sine-bar Fixture for Accurately Checking Thread Angles. The sine bar is widely used in machine shops, now-a-days, especially for testing screw threads and other work not parallel with or at right angles to the axis of the machine tool. This article describes a fixture with which it may be used, and when so used it is very accurate as a means of checking angles, and as such is especially desirable in making screw-thread plug gages, hobs, taps, and similar parts. The article describes the fixture thoroughly, as well as its use, the whole being well illustrated. *Machinery,* 5-22, 800w. MAH.

New System of Bevel Gearing Developed by Research. An investigation was conducted by the Gleason Works to determine the most quiet form of bevel gear tooth consistent with strength and durability. As a result of this thorough research, a new system has been developed, in which the addendum and dedendum for a pitch vary with the ratio, and are usually different for pinion and the gear. Similarly, the pressure angle depends on the number of teeth and the ratio. Details are given of the research work, the data obtained are presented in part. The new gear shape is shown and described, and much other interesting material. F. E. MCMULLEN and T. M. DURKAN, *Automotive Industries,* 5-18-22, 5100 w. MAH.

Double-End Center-Drive Lathe for Production Work. A detailed description of the new Greenlee lathes, which are built in 36 and 60-inch sizes. On fairly long work, such as rear axle shafts, it is possible to work on both ends simultaneously with this machine, so that the production time per piece is practically cut in half. P. M. HELDT, *Automotive Industries,* 5-18-22, 2000 w. MAH.

Tooling Equipment for Pistons. Description of the use of automatic machines and special equipment for machining lynite pistons at a high rate of production. The article describes the machines, the pistons, the tools and their method of use, also the fixtures needed. The illustrations are equally complete. EDWARD K. HAMMOND, *Machinery,* 5-22, 3100 w. MAH.

Portable Saw Bench for Pattern Shop Use. Description of machine used for this purpose. Dimensions are given. *Iron Age,* 4-6-22, 400 w. IG.



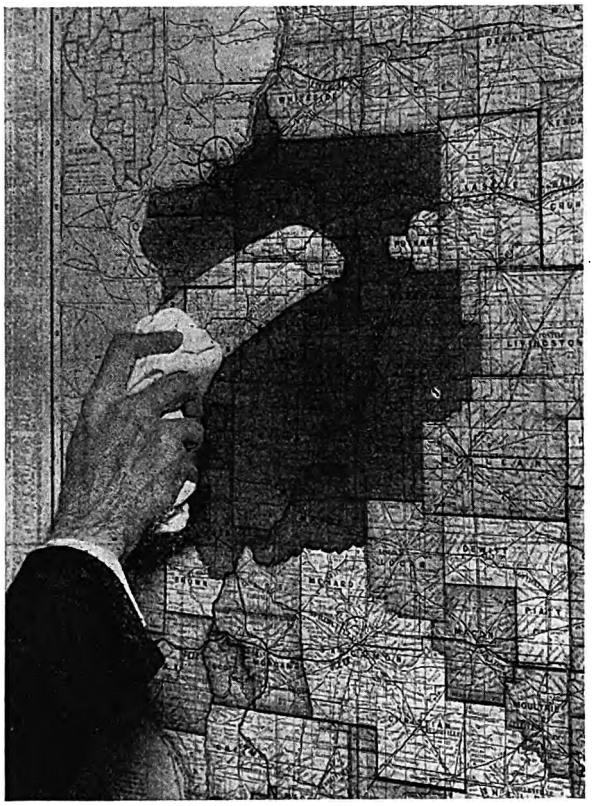
An aerial view of the famous Krupp Works at Essen, Germany, showing the great plant going full blast. Krupp is now manufacturing an almost endless line of metal products.—(Union Trust Co., Cleveland.)

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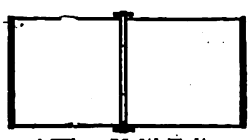
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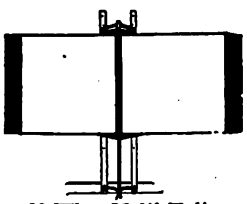


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Crude Oil Stock Accumulating

IN the opinion of the *Oil Weekly*, the crude oil market is no nearer stabilization today than it was several months ago. Since the first of the year 40,000 barrels of crude oil have been going into storage every day. It is estimated that this country now has about 150 days' supply of crude oil above ground. And although Mexican operators say that they have held down production because of falling off in demand for their crude, yet Mexico is still producing 450,000 barrels a day, and it is generally thought will probably continue to produce at that rate for several months to come.

While a large amount of oil in storage may tend to steady the market and prevent up and down flurries, the producer faces the danger of the purchasing companies arriving at the point which they have figured as the "stabilizing point" with production still far in excess of demand. It is pointed out that if the present rate of production in the United States is maintained, the producers may be forced to go into the winter with a continued oversupply of crude oil.

Future Demands on Oil Industry of U. S. A careful analysis of the situation with graphical charts to show the relation between consumption and production of crude petroleum, gasolene, kerosene, lubricating oil. Empiric methods of forecasting demand are indicated. Demands for crude petroleum for the next ten years will be determined by the growth of the automotive transportation and motor fuel requirements resulting therefrom. Future demands of crude petroleum and its products may be estimated by methods of empiric projection, but such methods are found to be unsatisfactory. Two rational methods of forecasting the demand for gasoline are described and applied and a method involving the principle of diminishing returns is advanced as the most satisfactory approach to the problem. By means of the method involving the principle of diminishing returns domestic demand for gasoline is estimated to be 6800 million gallons in 1925 and 8300 million gallons in 1930. Concluded that 585 million barrels of crude petroleum will be sufficient to support automotive transportation in 1925 and 580 million barrels in 1930 on the basis of a continuation of recent progress in technology. J. E. POGUE, *Oildom*, 5-22, 8000 w. IG.

Ramage Process a Success. New method of cracking oil which consists in passing oil vapors over iron ore in closed tube. The oil vapors are mixed with steam. Process is claimed to be much easier and cheaper to operate, is easily installed and yield of gasoline is increased. Yield of motor spirit, with the use of gas oil, has developed from 70% to 85% gasoline. Gas taken off the apparatus is used to heat the same. Iron ore is of nominal cost and does not deteriorate on usage. Product is free from carbon-forming compounds. By its use the "knock" in the motor is almost entirely eliminated and a 25% increase in power is obtained. Product is called "super-gas." J. B. WALDO, *Oil News*, 5-5-22, 1200 w. IG.

China Wood Oil. Gathering of nuts in China and method of manufacturing the oil are discussed. G. H. PICKARD, *American Paint Jour.*, 3-27-22. IG.

Recovery of Gasoline from Uncondensed Still Vapors. By more complete condensation of still vapors at petroleum refineries, 120,000,000 gallons of gasoline may be added yearly to national output. It is estimated that 50,000,000 gallons were recovered in this way in 1921. Condensation of vapors formed by heating crude oil is effected in refinery by leading vapors through coils of pipes submerged in water. On cooling, most of vapor becomes liquefied, but certain amount of vapor, due to insufficient time for proper cooling or to fact that its condensing point is lower than temperature of water, will remain uncondensed. Methods are shown for collecting vapors. Small vacuum is held on run-down lines where vapors are trapped off by means of goose-necks. This gas passes through traps which remove any condensate carried in the lines. Vacuum is held by either intake of compressor or in larger installations by means of exhauster. When gas of high sulfur content is encountered, unit for removal of sulfur must be installed. This is accomplished by scrubbing gas with solution of caustic soda or suspended solutions of oxides of iron or lime. In recovery systems, compression process is more common and consists of compressing gas to high pressure and cooling. Absorption process consists of absorbing gasoline from gas by passing through lower gravity distillate. When naphtha is used as absorbent, it is raised to gravity where it may be marketed as gasoline. When heavy oil distillate is used, gasoline is separated by distillation. Combination of two methods is made use of when gas after compression is passed through absorption towers. General figures are given of cost of construction of recovery plants based on capacity of refinery. D. B. Dow, *Reports of Investigations, Bureau of Mines*, No. 2344 (1922), 25 pp. CJW.

Brown Fractionating Shale Oil Retort. Consists of horizontal rotating cylinder about 30 ins. in diameter, constructed in three sections of 24 ft. each, to make a total length of 72 ft. for the retort. Helcial lining of the retort transports the shale from the feed end to the discharge end. Fire brick lined furnace surrounds each horizontal cylindrical section, so that each section may be heated to a different temperature. System very flexible, wide range of temperatures and speeds of travel of shale being possible. Outlet pipe for each section leads to separate condensers so as to produce various fractions of oil. Relatively large pieces of shale rock can be handled by this apparatus. F. E. SHEPARD, *Engineering World*, 5-22, 2400 w. IG.

Crankcase Dilution. Dilution is caused through the mixing together of the heavy hydrocarbons of the lubricant with the higher boiling point hydrocarbons from the fuel. Crankcase oil regeneration consists of process in which fuel and water dilution are automatically removed and the sediment, composed of carbon particles, sand and minute pieces of metal, is filtered out. W. H. PARRISH, *Oil News*, 5-5-22, 4500 w. IG.

Location, Design, Construction and Operation of Distributing Warehouses. A continued article describing various details regarding distributing warehouses used in the oil business. It is indicated that there is less standardization along this important line than in any other connected with the oil industry. Location must be determined from standpoints of availability to trade and source of supply. Character of the soil on which the warehouse is built plays an important part in determining the efficiency of the warehouse. Size and shape of tanks should be selected with the utmost care. Adequate storage facilities are important. Storage tanks should be made very carefully and should be absolutely tight. Not necessary to bury tanks in the ground. This is very expensive procedure. W. B. GOOLSBY, *Oildom*, 5-22 IG.

Welding in the Oil Fields. Welded joints are standard for new pipe line construction. Prairie Pipe Line Co. of Independence, Kans., has completed 140 miles of 8-in. pipe. Gives details of methods, etc. *Welding Eng.*, 4-22, 1200 w. APS.

At the Pittsburgh, Pa., experiment station of the Bureau of Mines, tests have been made in a small gallery to obtain comparative data as to the sensitiveness of methane and gasoline for the contemplated research as to the safety of motors in gasoline vapors. Permissible equipment, which has been tested by the Bureau of Mines and more carefully inspected by the manufacturer, rather than "flame-proof" equipment, should be required in all gaseous mines or gaseous sections of mines and the use of any other should be discouraged.—*Bureau of Mines Bull.*

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Insurance Policies with Your Paper

IN an effort to increase their circulation many newspapers in England are offering accident insurance at greatly reduced rates to subscribers. It is reported that the competition among various newspapers that have adopted this policy is resulting in almost incalculable liabilities. The insurance companies are declining to underwrite anything but legitimate transport risks and are said to be strongly opposed to the piling up of claims so that they may be employed by the newspapers as daily "advertising points." It is now reckoned that two or three of the London papers are offering indemnities against the accident risks of man and wife which will cost from half to two-thirds of their total revenue from sales. While the offering of insurance policies by newspapers is not illegal in England, it is believed that their cost will soon become prohibitive. Twelve months of the present accident and disease benefits will cost one of the London journals at least a half million sterling. Other newspapers are accumulating burdens almost as heavy.

Evolution of Bookmaking. Earliest records of books are sheets of stone, brass and lead or tablets covered with wax on which writing was engraved. Egyptians discovered writing on papyrus. Introduced use in Greece and Italy, but, due to scarcity of papyrus, vellum and parchment were used. These, like papyrus, were rolled up on roller of wood or metal. For convenience someone thought of cutting two sheets of vellum same size and sewing them together; so book evolved. Scribe wrote entire book, made own ink. Book sent later to rubricator, who added capital letters, the colophon and liturgical directions. Demand for these books so great that block books were introduced to multiply more rapidly manuscript volumes. (Continued.) JAMES MACLEHOSE, *Ben Franklin Monthly,* 5-22, 1000 w. MBB.

Future of Color Work. Improvement made in color work in future must depend on non-filter plates for color photography. Present orthochromatic photography not useful for three-color work. They show possibilities exist of making plates which require no filter. Should be possible to make improvement in illumination of original. Arc light too violet; daylight best illuminant for color work. Three-color inks generally used to produce black by superimposing them. But it was only rough application. Necessary to establish four-color process now that error of supposing red and green made yellow, has been proved. *Natl. Lithographer,* 522, 600 w. MBB.

Hints About Embossing. Printing and embossing done at one operation in using alabastine, as it is considered that counter made from this powder will last longer than anything else tried. Alabastine brings out all letters and details, and after mixing composition for some time is possible to spread it without cutting away, which is saving on all jobs. Extra impression will not make embossing deeper if it is not in die. JAMES J. MCGILL, *Amer. Pressman,* 5-22, 500 w. MBB.

Care of Flatbed Presses. Life of machine dependent upon care received. Important that operator should study machine and instruction book carefully. First fundamental principle in care of printing press is leveling. Press standing on anything but solid foundation is likely to "go out of level" during first months; should be leveled occasionally during first year and possibly afterward. Always look machine over carefully before throwing switch, even then turn over for complete cycles before throwing into high. Oil everything that moves at least once a day, harder worked parts twice. Adjust to prevent wear and to secure perfect work. In case of chronic misregister, begin at bottom and work up. Give careful attention to each unit. Keep press clean. FRED S. ENGLISH, *Amer. Pressman,* 5-22, 1000 w. MBB.

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Small letters were unknown until about the seventh century, and even after their introduction the capitals continued to be used much more than they are now, while the few punctuation marks first employed by the grammarian Aristophanes of Alexandria, about the middle of the third century before the Christian era, did not come into use until the Venetian printer Aldus Manutius used them with striking effect about 1500. In short, the printed page as it is known to us is a very modern product. Perhaps the contrast between the ease with which you have read this paragraph and the difficulty you had in reading the preceding one will help you to appreciate more fully your present-day advantages.

Unfair Use of Capitals

Because capital letters in typography are being used less and less as we study legibility, and are becoming unpopular, is no reason why they should be treated unfairly. The accompanying clipping is from our well-known *Ladies' Home Journal,* which is demonstrating to its readers how difficult it is to read capital letters in a mass and how easy it is to read lower case. Why were the spaces left out between words in the capital group? No wonder the group is hard to read. Leaveoutthespacebetweenwordsinthelower caseanddonotdividethewordsproperlyand thelowercasetoowillbedifficulttoread.—
("Fair Play," in letter to the *American Printer.)*

Why U. S. Newspaper Law Should Be Codified. National commission to draft and perfect code covering all branches of law. Action by legislatures of States suggested. JOHN H. PERRY, *Fourth Estate,* 5-20-22, 500 w. MBB.

House-Organs, Wheezy and Otherwise. Hardly business today that would not be better off if issued proper house organ. Beware professional house organists. Editor and chief contributor should be head of concern or near enough to it to exercise right of saying what is most advantageous for customers. These often have little idea of what firm is ready and willing to do for them. Such data should be right and proper province of house organ. H. L. CLEVENGER, *Office Appliances,* 5-22, 2000 w. MBB.

Selling Printing with Help of Dummies. Use of dummies nearly always essential to securing of important orders and contracts. But waste in their use is tremendous, due to lack of care in planning. Most feasible to visualize printing job complete before setting type or making engraving. Have sketch dummy complete, lettering all indicated, pictures sketched in, photostats and silverprints in exact position; complete proposal for printing, including blank dummies showing exact kind and weight of paper stock to be used. Such dummies please prospects and gets them to rely on firm for service. Another effective dummy service is complete direct-advertising plan to cover number of mailing pieces to be distributed over certain period of time. WILLIAM A. KITTREDGE, *Amer. Printer,* 5-20-22, 1500 w. MBB.

Discounting the Count

A COUNT used to be a man in charge of a count of 500 persons to whom he was a sort of overlord. This is not true today because of altered political conditions. We still have Counts, but the Count business has changed somewhat.

Business, of all kinds, has undergone something of a revolution. It was not so many years ago that pack peddlers were the sole distributors and transporters of many of the household articles of the day. Their legs set the limits for most distribution problems in those days.

Modern transportation, progressive sales methods—*and advertising*—have broken the shackles of time. They make a speedy job of what used to take years. Through advertising many an article has been introduced simultaneously in stores all over the country.

Advertising today is the method used by business to tell you why you should have certain goods and how to identify those goods. The advertisements you find here are a truthful *catalog* of needed merchandise.

Articles of all kinds and for all purposes are presented in a pleasant way through the medium of type and picture. The outstanding requirements of every member of the family are met by offers of good merchandise of proved value.



Use the advertisements for guidance and you will be a constant gainer



Higher Prices for Newsprint Probable

THE fact that consumption of newsprint paper during March was greater than during the same three months in the "banner" year of 1920 is believed to indicate that a rise in prices may be expected in the near future. At the end of March the number of days' supply in the hands of the American publishers was lower than it had been since May 31, 1920. At the same time the number of pages being printed by the larger newspapers of the United States was greater than it was in either 1920 or 1921. And it is pointed out that this combination existed in the newsprint market before the last increase in prices. The accompanying tabulation of percentages of increase shows in concise form the recent improvement which has taken place in the consumption of newsprint.

NEWSPRINT PAPER CONSUMPTION IN U. S., 1922 AND 1921

1922	% Increase Over 1920	Corresponding Period of 1921
January	6.5	10.4
February	6.8	10.7
March	9.7	9.9

Percent of increase during first two months of 1922 over that during

First two months of 1920	6.9%
First two months of 1921	10.6%

Percent of increase during first three months of 1922 over that during

First three months of 1920	7.7%
First three months of 1921	10.3%

Oat Hulls for Strawboard and Paper Pulp. Results of semi-commercial and mill runs on oat hulls indicate they are capable of utilization in manufacture of board using digestion with lime in same manner that straw is treated. Yield obtained and character of stock indicate cost of converting oat hulls to board would not exceed cost of converting straw, and in yard and rotary room labor savings of approximately 50 cents per ton of product are possible. Also saving in steam required for drying. Bursting strength of sheets made from oat hulls not as high as from straw board, but satisfactory results obtained by mixing oat hulls with equal portion of straw. Tougher sheets obtained by cooking small amount cotton linters with hulls together in rotaries. S. D. WELLS, *Paper Mill*, 5-20-22, 4000 w. MBB.

Molding of Chemical Pulp. All kinds of pulp may be attacked. Description of spores, which are always present in air. All pulp as manufactured well infected unless run directly to paper machine. Requirements for development are food, air, suitable degree of warmth and moisture. Protection may be obtained by poisoning with antiseptic material, such as sodium fluoride, storage at low temperature, or drying pulp before storage. R. J. BLAIR, *Pulp Paper Mag.*, 5-25-22, 800 w. CJW.

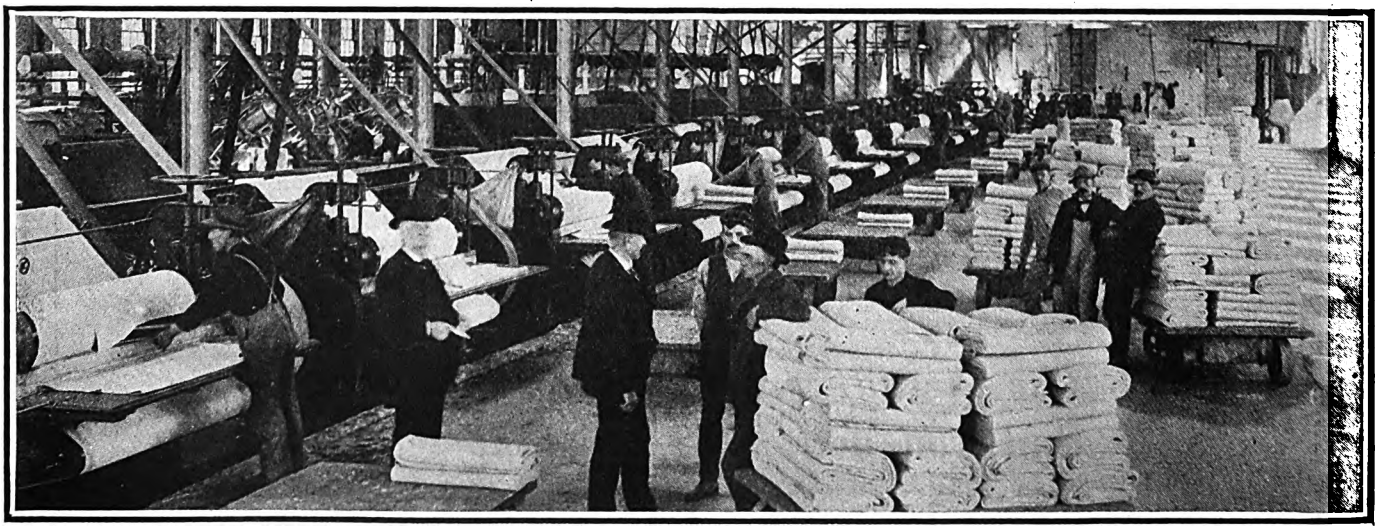
Freeness Testing of Pulp. Advantages of maintaining stock at desired degree of freeness are: In grinder room, increased production at decreased hp. per ton, by knowing immediately when stone needs dressing or burring, and not allowing power to be consumed indefinitely and unproductively by dull or glazed stones. In beater room to determine degress of beating and thus avoid losses in machine room because of variation in stock. Complete outfit described for testing freeness, arranged on and in cabinet described and illustrated. F. M. WILLIAMS, *Paper Mill*, 6-3-22, 1000 w. CJW.

Methods of Furnishing Stock. These are: Rolls or baled sheets, hydraulic pressed sheets, moist laps or sheets, drainer stock, needles, and slush. Three general systems for preparation of stock, beaters, mixing tanks and continuous mixing systems. Methods of measurement complicated by variation of moisture content. *Paper Trade J.*, 6-1-22, 500 w. CJW.

Half-Stuff from Waste Papers. Four operations involved, sorting, dusting, cooking and washing, of which last two are in state of rapid development. Carrier system and screen system compared; cost favors the former, quality the latter. In case of rotary and vat cooking processes only slight shredding and light dusting are necessary. Vomiting tub, rotary and vat processes of cooking compared. Rotary can cook paper stock just as economically and well as any other process in use at present time. Beater type of washing both wasteful and inefficient. May be replaced some day by intermittent washer. Continuous washer is ideal theoretically, but has several practical disadvantages which will greatly hinder its general adoption by paper mills. E. G. MILHAM, *Paper Mill*, 6-3-22, 2500 w. CJW.

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Investigations and Reports on Conditions Affecting Profits and Investments..... 1116



Manufacturing Wood-Pulp in Maine

The material in the foreground that looks like blankets is pulp in "laps." This pulp is shredded in "binders" into fibres, and it is from these fibres that paper is manufactured. (© International.)

Where Are Your Customers?

The continued revival of purchasing activity is assured.
Some business men are *waiting* for the flood tide;
others are going to *meet* it.

It is advantageous to know not only *when* to expect business but also *where* to expect it. The current Forecaster tells specifically why purchasing activity will come earlier in the cotton growing than in the grain producing sections. It is well worth reading, and should enable you to make a fair estimation of the value of the Brookmire Service, which answers innumerable other perplexing questions.

Send for a free copy of Forecaster DD today.

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RUBBER · PLASTICS

Manufacturing Tires for Orders—Not Stock

OWING to the frequent spurts and slumps in tire building, involving the laying off and returning of men, tire manufacturers have stopped expanding finished goods inventories and are applying production direct to sales. According to *Motor Record* they are determined never to be caught, as they were in 1920, with a huge supply of tires on hand. Scarcely a company has an inventory exceeding a 60-day tire supply based on normal sales. The extent to which this policy is carried is evidenced by the fact that in many cases tires are wrapped and loaded in freight cars while still warm.

There is, however, a steady increase in the output of practically all plants. As compared with January of the current year, this increase ranges from 30% to 50%, while the increase over May, 1921, ranges from 25% to 100%. Although mechanical goods lines have been slower to recover, recent months have brought a very satisfactory increase in orders. Rubber sundries, novelties and footwear reflect an encouraging outlook.

Tapping Experiments. This article is concerned with a series of experiments that were performed on rubber trees to ascertain the effect of different methods of tapping the tree on the yield and quality of the rubber obtained. The experiments were carried out on trees of various ages. *Rubber Age,* 4-10-22, 1700 w. IG.

Use of Magnesia in Rubber Industry. History of application of magnesia in rubber field. Several types of magnesium carbonates employed. Properties of various carbonates described. Carbonate of magnesia can be used to considerable proportion in admixture with rubber. Since slightly basic it accelerates cure in small degree. In conjunction with zinc oxide it produces tough, stiff compound suitable for use on tire tread or for truck tires. Said to increase abrasive resistance of rubber stock containing it, but for this purpose not over 10% should be used, and compound should also have considerable quantities of zinc oxide and gas black. Primary use of calcined magnesia in rubber is to increase rate of cure. Second purpose is to dry up and stiffen compounds containing considerable resinous or bituminous material. Use of magnesia somewhat precarious, either too much magnesia, or too much sulphur will give stock which will overcure and harden up on standing. In this respect litharge is handled more easily, and is preferred in all goods excepting those in which black color produced by litharge is objectionable. Because of this drying up on age, magnesia can be used in ordinary soft rubber compound only to extent of 1.5% to 2% of weight of rubber. If sulphur content is very low, this may be increased to 3%. Effect of magnesia on acceleration of vulcanization of rubber is discussed as well. A. H. SMITH, *Asbestos,* 4-22, 400 w. IG.

Composition and Use of Golden Sulfide of Antimony. In the investigation made by the authors into various samples of commercial golden sulfide it was found that the assumption that the material contained the penta-sulfide was incorrect. The conclusion is drawn that commercial golden sulfide of antimony contained no higher sulfide than the tetra-sulfide. It was also indicated that the sulfur extractable by carbon disulfide was available for vulcanization of the rubber. F. H. SHARPE, *Rubber Age,* 4-25-22, 2800 w. IG.

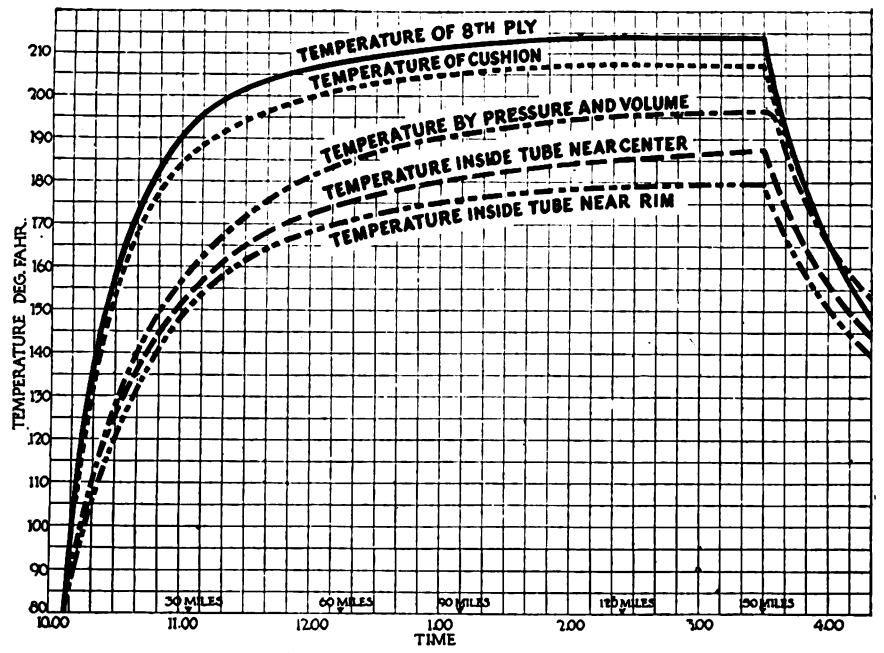
Methods of Analysis. Report of the committee on methods of analysis of rubber division of American Chemical Society. Discusses reasons for analysis, preparation of sample, reagents and gives methods for specific gravity, chloroform and alcoholic-alkali extract, free and total sulfur, ash, barium sulfate, antimony, free carbon, nitrogen, unsaponifiable matter and waxy hydrocarbons. *J. Ind. Eng. Chem.,* 6-22, 5000 w. CJW.

Vacuum Process of Hollow Ball Making. Description of the vacuum process of making hollow balls, a process which is revolutionizing the production of hollow rubber goods of all sorts. Calendered sheet rubber is used for this purpose. *India Rubber World,* 5-1-22, 1500 w. IG.

Importance of Teamwork in the Factory. How one can help the other in operation of a rubber mill. Checking up errors and bringing them to the attention of the proper persons or department instead of blaming a common "goat." Several interesting examples, indicating how teamwork helps to secure efficiency in running the plant, are described. A. E. FRISWELL, *Rubber Age,* 4-25-22, 3000 w. IG.

Rubber Business Thirty Years Hence. An imaginative account of how the rubber business will have progressed by 1951. Such improvements as removal of the rubber odor, self-repairing rubber, crude rubber tanning, superresilient rubber, synthetic cotton, etc., are forecast. *India Rubber World,* 4-22, 3000 w. IG.

Plastic Raw Materials and Products. Progress in development of use of papier-mâché and plastic wood as a base for decorative appliances and ornaments. Use of compressed wood fibers for this purpose has been perfected. The lightness of the product is of particular importance. *Raw Material,* 4-22, 1500 w. IG.



Temperatures of various parts of a 40 x 8 tire as obtained by several methods. The room temperature during this test was 90° F.—*(Automotive Industries.)*

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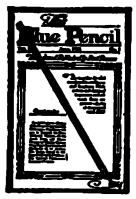
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The Saving Grace

as applied to magazines, means the retention of all issues which may be worth something later on. We submit that *each* copy of the *Industrial Digest* is worth saving because of the more than five hundred digests of important articles which it contains. The Annual Cumulative Index which will be sent without charge to all subscribers will make this valuable data instantly available, *provided* the copies are filed for reference.

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Joint Advertising Campaign for Candy Makers

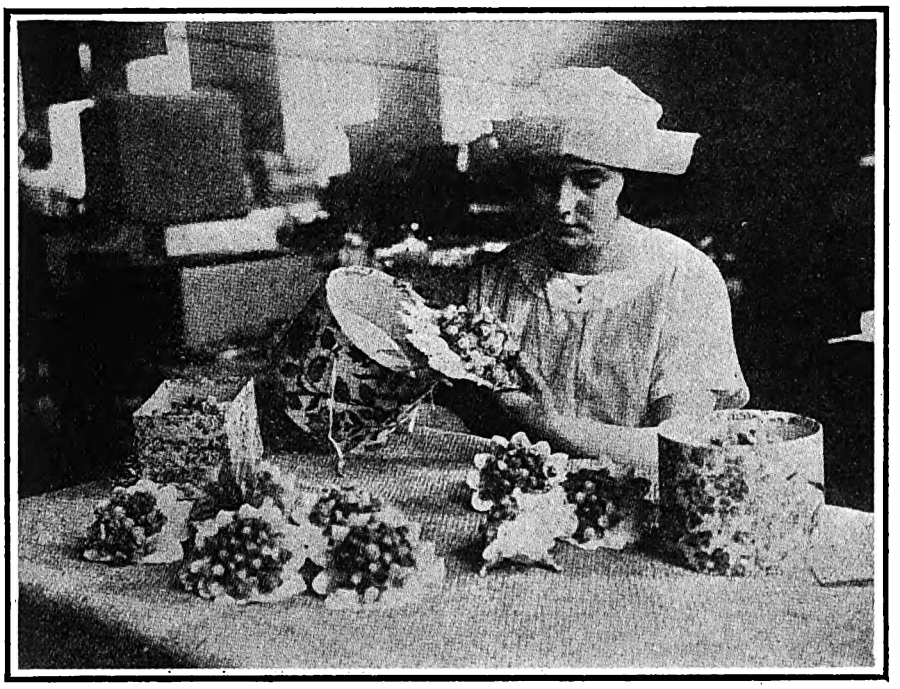
ACCORDING to a writer in *The Western Confectioner*, cooperative advertising by the candy industry will prove beneficial only if its purpose is to increase the sale of candy generally, not to increase the sale of some particular kinds of candy to the detriment of others. The first step should be the adoption of a slogan and, supporting the idea, the writer cites the success achieved by the florists and jewelers who built their campaigns around slogans directly suggestive of gifts.

It is believed that the vital thing in the plan is to help the retailer sell more candy to the consumer, since it is upon the retailer that the manufacturer depends for distribution, and that the concentration of purchases on special days or occasions will secure the desired result more effectively than lower prices, appeals of food value, cleanliness or purity.

Paper Mulching for Sugar. Paper mulching of sugar cane and pineapple plants first used in Hawaii likely to come into general use in countries where intensive cultivation is required. Paper serves both to shed water that comes from excessive precipitation and to hold moisture in ground. Labor saving obtained by use of paper also important; under old system of cultivation keeping crop free of weeds cost $30 to $40 an acre. Use of paper eliminates this cost. Another important factor is that by use of paper mulching leaching of soluble nitrates which are used for fertilizing is prevented. Experiments in manufacture of mulching paper indicate abundance of raw materials in United States well suited for this purpose. W. D. HORNADAY, *Paper Mill*, 4-29-22. HHH.

Mechanical Harvesting of Sugar Cane. A description of the Luce machine and its work. This machine cuts off the growing cane just below the ground, strips it of leaves and surplus sprouts or other material, and cuts off the tip just above the last ripe joint. This leaves the cane then in just the form it is needed for the grinder. Consequently the machine eliminates all hand or manual labor, and since it is self-propelled, all animal labor as well. It is said that a complete machine in full operation is equal in results produced to 45 men. The article describes the machine in detail, following the inventor all through his early struggles, and describing all of the early machines as well. *Exporters & Importers*, 4-22, 2900 w. MAH.

Sugar. Points out need for confectioners to know what they want and urges co-operation of manufacturer in furnishing particular sugars for these purposes. First must know strength of sugar and corn sirups. White running creams should be made from first run liquors and not from granulated. Refiner's syrup may be used but its eccentricities must be learned. Many problems awaiting solution and need for research laboratories is very great. F. W. MURPHY, *Candy Mfr.*, 5-22, 1200 w. CJW.



Candy Flowers Nowadays Are Tastefully Packed

Here is shown a girl preparing candied bouquets ready for the exclusive trade of a New York confectioner. Small "band" boxes are used for the purpose—oval, round and oblong. The boxes usually have flowered designs.—*(Candy and Ice Cream.)*

Candy Making. Changes that take place in candy kettle are loss of water, amount depending upon temperature used until at 320° F. only about 2% remains. Other changes above 240° F. are inversion of sucrose to glucose and levulose, a reaction in which time plays part. Acids and certain salts accelerate reaction. Sterilization also results. Water may have two effects: Effect upon sugar as regards inversion and its freedom from or contamination by micro-organisms. Comparatively seldom that water does not contain enough lime to render it fairly satisfactory. Candy is exceedingly free from organisms and is undoubtedly one of purest forms of food. A. P. BRYANT, *Candy Mfr.*, 5-22, 1200 w. CJW.

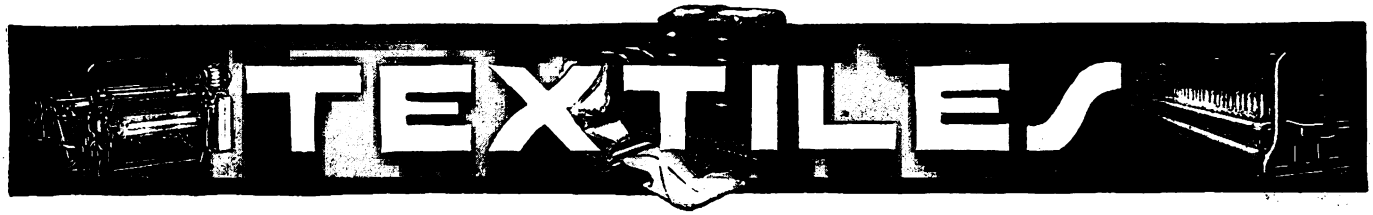
Gelatin. Edible gelatin made from calfhide cuttings, bones and pigs' feet. Ossein, from bones, of greatest importance. Manufacture consists in washing, soaking in milk of lime several weeks with changes of liquor, washing free of lime, adding sulfurous acid to bleach product and then boiling, heat being furnished by superheated steam, temperature of 80-85° being rather carefully maintained. After 6-8 hrs., solution is drained off and operation repeated three to five times. Upon standing, brilliant supernatant gelatin solution is obtained, which is concentrated to consistency that will easily jelly. Then dried. Other articles to follow. R. H. BOGUE, *Candy Mfr.*, 5-22, 1800 w. CJW.

Carbonated Ice Cream. Carbonation of milk and ice cream does not guarantee the product to be a safe product. While the process may have many commercial advantages and may be of decided benefit to dairy industry, the experiments reported indicate that the process cannot be relied upon as a means of insuring sanitary quality of dairy products. M. J. PRUCHA, *Ice Cream Trade J.*, 5-22, 1500 w. CJW.

Ice Cream in Its Native Land. Formulas used by Italians for ice creams: crema gelata; sorbetto; granita; poncio; spumose; zabaglione; spumone; bombe; charlotta; marenga; bavarese. *Soda Dispenser*, 3-22, 700 w. WRR.

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Revolutionizing Cotton Picking

ACCORDING to the *Engineering World*, the development and successful use of an improved electric cotton picker promises to supersede the hand gathering of cotton in the South.

Operating data collected during thorough trials of the cotton picker indicate that it will be possible for a person to gather from 400 to 700 pounds of cotton a day as compared with 70 to 150 pounds a day by hand. By means of this new device the cotton grower will be able to harvest all the cotton he plants, and to do so before the rains and frosts damage the bloom and lessen the value of the crop. Among other advantages is the fact that the cotton can be picked when ripe, thus improving the grade and adding to the value of the bale. Moreover, the motor apparatus picks cotton in a much cleaner condition than by hand. Under manual labor it is estimated to take 1600 lbs. to make a 500-lb. bale of cotton lint after the seeds and dirt are removed at the gin. Electrically picked cotton shows a saving of 200 lbs. in the amount of cotton which will produce an equal size bale of cotton lint.

Spinning Tests of Meade Cotton. Table showing results of tests. Can be substituted for Sea Island. Can only be distinguished by experts. *Cotton Mill News*, 4-13-22, 1500 w. WRR.

Bleaching Cotton Fabrics. Important in manufacture of cotton goods is adjusting of scouring and bleaching process, which involves construction of fabrics for best results. Condition of finished goods is result of all processes from selection of raw material to final operation of finishing. *Textiles*, 5-22, 700 w. MBB.

Tests to Determine Efficiency of Weaving and Finishing Colored Cotton Goods. Test made to ascertain absolute shrinkage of lot of goods put through weave and finishing departments. Result supplied figures upon which to base close competitive selling prices, showed seconds exceedingly low, showing what is possible if close attention always given by everybody; rags were higher than should have been; could have been trimmed down closer, also remnants and short lengths. Good plan to measure size of filling parcels, and filling itself must be right size. Test showed pays to watch weight of warps as well. H. D. MARTIN, *Textile Colorist*, 5-22, 1500 w.

New Experience in Dyeing and Printing with Indanthrene Colors. For dyeing indanthrene colors, which possess strong affinity for fibre on artificial silk, which is used to increasing extent, add to vat some dekol and glue to insure level results. Addition of dekol acts as thickening agent to bring dyestuff in fine state of divisions as possible, and keep in suspension. Important feature in manufacture of colored cloth is fastness of indanthrene colors against chlorine. In printing cotton goods with indanthrene colors, most important part of machinery is ager. Irregularities in results always caused by quantitative or qualitative changes in nature of steam, result of rust or dirt in pipes. Dull colors caused by overheating ager are rectified by running unprinted goods through, allowing time to cool. *Textile Colorist*, 5-22, 600 w. MBB.

Wool Blending Importance. Blender should know kind of thread he wishes to make; kind of fibres he has to use; price final thread is to cost; behavior of various wools and fibres, etc. *Canadian Tex. Jour.*, 4-11-22, 700 w. WRR.

Saponification Scouring of Wool. Four methods are used in scouring wool. Saponification claimed to be efficient cleaner; method of using this process. "Low goods" scour, use of solvents. J. SCHOFIELD, *Textile World*, 4-8-22, 2000 w.

West Australian Wools. Description of method of breeding, troubles of climate, etc. *Canadian Tex. World*, 4-11-22, 2000 w. WRR.

Dyeing Wool and Worsted Pieces. Important that dyer be kept informed of any change in mixture of wools. Fulling may be responsible for clouded pieces. Mineral soaps, from hard waters, may cause light spots in piece, due to waterproofing action. Palm soaps used in fulling with great success. Discussion of chrome mordants and assistants, the single bath chrome methods and afterchrome methods. Sulfon cyanides work much better when half their weight of bichromate is put into dye bath. All dyes should be in full solution before being added. J. A. KNOX, *Am. Dyestuff Reporter*, 5-22-22, 2800 w. CJW.

Purifying Thrown Silk. Reports of results of extracting various unsoaked raw silks with a variety of solvents; 80% to 90% of an ordinary fatty oil present in soaking bath is removed by silk; 10% of soap remains on silk, by far larger portion remaining in bath; 80% of sulfur-bearing fat of sulfonated oils remains in bath, as well as any soluble salts present from any source. Practically all oil is removed by extraction, together with silk wax and greater part of sulfonated oil, but mineral salts, oxidized and dry, saturated soda soap, will be partially left behind. Acetone or petroleum ether, containing one-fourth its volume of methyl alcohol, is good extraction agent. Time factor important, as prolonged extraction slightly affects silk substance. H. S. MUDGE, *Am. Dyestuff Reporter*, 5-22-22, 2000 w. CJW.

Dyeing Acetyl Silk. Cellulose acetate silk can be dyed directly without use of swelling agents and other costly and difficult pre-treatments. With Dreyfus process, no selling agent required. In method of dyeing untreated silk by selected dyestuffs having a sympathetic affinity for cellulose ester, basis of selection is by chemical constituent groups favorable to absorption and fixation of dyestuffs such as amino and alkyl-amino groups, hydroxyl, nitro and ketoic groups. Important to wet silk in special bath to remove dirt. All basic dyestuffs can be dyed readily on acetyl silk without previous treatment. Tannin mordants are unnecessary. Temperature of dye bath should be carried up to 65° C. in two stages. Dyeing of gallocyanin dyes is closely similar to basic dyes; alizarine dyes are generally dyed from plain bath in soft water. Certain of the sulphonated azo dyestuffs can be dyed directly on acetyl silk, chiefly yellows, oranges and some reds. Vat dyestuffs, including indigoid and those of the algol and indanthrene class, which can be vatted without use of large quantities of caustic soda, are suitable for dyeing unsaponified acetyl silk, saponification during dyeing being inhibited by presence of ammonium salt. Remarkable affinity of cellulose acetate for aromatic amines and phenols suggests vast range of possibilities for developing azo dyestuffs by diaotizing on the fibre. J. F. BRIGGS, *Textile Colorist*, 5-22, 2500 w. MBB.

Dyeing Viscose Silk. Artificial silk often capable of being dyed at low temperature. Bleaching may be done with weak solution of chloride of lime. Viscose artificial silk usually dyed with direct cotton dyes. Bath made up with reduction in amount of liquor. From 5% to 20% of the weight of fibre is added in form of Glauber's salt. Temperature is maintained at about 120° to 140° F. Soluble oil often put into dyebath for purpose of facilitating evenness of dyeing. Many basic dyes may also be employed to dye artificial silk. Likewise acid dyes may be used, though fastness against washing cannot be expected from their use. GEORGE EMMON, *Silk*, 1500 w. HHH.

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Structure and manufacture of standard cloths used for general, military and naval purposes: a very complete work. 342 pp. $6, postpaid.

DYEING AND CLEANING OF TEXTILE FABRICS, *by Owen and Standage.*

Gives a list of dyes; recipes for dyeing wool, cotton and silk; preparation of cleaning liquors; removing spots and stains from garments; washing of silk, cotton and flannel and other woolen articles, etc. 120 pp. $1.35, postpaid.

BLEACHING AND RELATED PROCESSES, *by J. M. Matthews.*

Invaluable to the textile chemist, the practical bleacher, responsible Mill Executives and manufacturers of bleaching materials: an authoritative treatise. 700 pp., 300 illus. $8. postpaid.

TEXTILE SOAPS AND OILS, *by Hurst and Simmons.*

A handbook on the preparation, properties and analyses of the soaps and oils used in textile manufacturing, dyeing and printing. 204 pp. $4, postpaid.

COTTON SPINNING (3 vols.), *by Taggart.*

Complete reference work on cotton spinning. Vol. I includes all processes and machinery through carding. Complete calculations. 216 pp; 114 illustrations. Vol. II includes all processses and machinery of drawing, combing and fly frames. Complete calculations. 200 pp.; 84 illustrations. No. 3 includes ring and mule spinning; doubling, humidity, etc. Complete calculations. 435 pp.; 86 illustrations. $10.80, postpaid.

WOOLEN AND WORSTED, *by Robert Beaumont.*

The manufacture of woolen, worsted and union yarns and fabrics in one large volume, from raw material to finished fabric. 755 pp.; 500 illustrations; 56 plates. $10, postpaid.

SILK MANUFACTURING AND ITS PROBLEMS, *by Chittick.*

A cyclopedia for men in the silk manufacturing, dyeing and finishing business, covering problems from selection of mill site to marketing the product. 500 pp. $2.50, postpaid.

Book Department, INDUSTRIAL DIGEST

25 West 45th Street, New York City

Time To Invest Abroad

(From page 1132)

prospect of such return as an experienced man ought to be able to get for his money. He knows there are plenty of good propositions looking for capital, if he could only find them and if he only had some way of making certain that those he finds are really sound.

There is one agency to which business men in the past have not been in the habit of referring for investment information, but which seems well equipped to give such service. This is the certified public accountant.

A number of accountants in the past few years have undertaken the task of investigation investment opportunities for their clients. This work has come to them as an incident of their regular accounting practice, and the fact that more money than usual is now seeking investment has occasioned the enlargement of their business. Some of them are now going so far as to establish "capital promotion departments," the function of which is to unite, on a sound basis, the investor and the seeker of funds.

"I believe that this sort of service is going to become one of the most important branches of the accountant's work," said M. L. Seidman, of Seidman & Seidman, a New York firm of certified public accountants. "We are an investigating profession, and therefore especially fitted to perform such duties.

"We find that a great many of our clients are looking for good investments, and in the course of our work we also run into many businesses which need capital. It is the most natural thing in the world for us to bring the two together.

"Certified public accountants cannot, of course, be brokers. They are members of a carefully supervised profession, with professional reputations to sustain. They should not, and indeed they cannot properly, charge commissions for capital promotion work. Their function is merely to investigate propositions for the business man who wishes to invest, and to lay all the facts before him.

"It is no easy matter to find a suitable investment for a business man with surplus capital. There is an unlimited supply of propositions, and an almost equally large supply of capital, but not all of the business seeking funds will stand the tests that a certified public accountant must apply to them, and sometimes those which pass the tests are not suited to the particular investor whom the accountant has in mind.

"A certain client of ours with several hundred thousand dollars which he cannot use in his own business has been looking for many months for something to put the money into. We have been looking, too, but we have not found the right thing yet. Surprising, isn't it, that so much money should go begging? But in the end I believe our client will get what he wants. We are now investigating several propositions for him, and we will give him the facts of these cases. We won't tell him what to buy, or what not to buy, but we will show him just what is what, and our professional reputations will stand behind our report. And I think that he will do better with the aid of such service than he would have done without it."

Oil from Canada

(From page 1137)

to Canada's 288,760. This production is reported by the Government geologists to be from the crest of a dome of the Delaware limestone (coniferous) at depths of about 300 ft. This productive field was developed from an abandoned prospect as a result of careful study of structural formations followed by practical drilling, it is quoted as proof that the possibilities of the Ontario oil fields are far from exhausted.

In New Brunswick and Nova Scotia oil possibilities have attracted attention since 1859, but competition with the enormous output of the adjacent United States oil fields has done much to discourage production.

New England's Cotton Mills

(From page 1127)

over which neither the manufacturer nor the most enlightened arbitrator has any control."

And the *Textile World,* an organ of the trade, said editorially:

"We can sympathize with the desire of industrial operatives to retain their comparative luxuries, but their refusal to bear their fair share of the enforced reduction in production costs and to endeavor to reduce their wage losses by longer and harder work will cost them the sympathy of a fair-minded public.

"Mighty few mills, business firms, executives or stockholders can show gross income today 75% to 80% higher than that of 1914, yet that is the wage advance that will be retained by New England textile operatives after the latest wage revision has become effective. Furthermore, in certain mills where weekly working hours have been increased, a large proportion of the most efficient workers are actually earning more than they were before the 20% wage cut was made," since they are paid by the hour.

With both sides thus standing firm, the strike dragged on and on. It began on January 24 with the closing of four mills in Pawtucket, R. I., and within a few weeks spread farther in Rhode Island. On February 13 it spread to Manchester, N. H., and in March it reached the Lawrence district of Massachusetts. In the beginning of June several mills attempted to reopen, feeling that the endurance of the operatives must be waning. Only a few workers appeared on the job at first, but the mills declared that the number was steadily increasing. By the middle of June the impression was abroad in the trade that the backbone of the strike had been broken, although few struck mills were carrying on any sort of extensive operations.

According to figures compiled by the *Daily News Record,* brought up to date on June 17, the number of spindles idle were 2,764,130; looms, 79,934; operatives, 50,763. The closed mills have a total daily capacity of 2,396,211 yards, and the total lost production up to and including June 17 amounted to 226,482,479 yards.

What does the future hold for the New England textile manufacturers?

There can be no question that they are in an extremely difficult position. Even if they are able, in the present instance, to enforce their wage reductions, their situation will be none too comfortable. The wages they can pay do not compare favorably with those paid by other industries in the North. The union in this strike is showing fully as great strength as it has ever shown before, and some think it is stronger than ever. Surely the labor troubles of the mill men will not be over after this strike. As Mr. Harris pointed out, the advantage of the South in this respect is great. Added to the advantage of proximity to raw materials, it is likely to be overwhelming.

A man who has followed the textile industry closely for many years expressed this opinion of its future:

"Capital invested in cotton mills will probably transfer itself by degrees to the South. A textile plant involves a tremendous investment in structure and equipment, and therefore the change in location cannot be sudden. Mill owners will put up a strenuous fight before they will abandon their property in the North. They will probably refuse to build new mills, however, and as the old mills get played out move their capital below the Mason-Dixon line. This is being done to some extent already. There is undoubtedly much Northern capital in the Southern textile mills today.

"The speed and completeness with which this change takes place will depend upon many factors, including the demand for cotton goods. If the industry experiences again such a clamor for cloth that the less economical mills can survive, then the North may continue for many decades as a leading textile center. But if competition is keen, the process of elimination may be faster than the Northern mill owners expect."

List of Magazines Digested

THE following selected list comprises nearly every leading trade and technical periodical in this country. The most important and informative articles (exclusive of matter bearing only a temporary or local interest) are carefully digested by our editorial staff and classified according to industry. Where an article relates indirectly to additional industries a reference will be found on the page devoted to each related industry.

The letter following the name of the publication denotes the period of issue thus: W., Weekly; S-M., Semi-Monthly; M., Monthly; S-A., Semi-Annually.

The figure denoting the annual subscription rate is followed by the single copy price. For the convenience of those who desire to subscribe to the various publications or to purchase special numbers, the address is given in every case. Constant additions to this list will be made as fast as practicable, and the editors will appreciate suggestions from our readers in regard to publications which, in their opinion, should be included in the magazines covered by The INDUSTRIAL DIGEST.

ADVERTISING

Advertising & Selling Mag.—W. $3, 15c. 471 4th Ave., N. Y. C.
Associated Advertising—M. $1.50, 15c. 110 West 40th St., N. Y. C.
Blue Pencil—M. $3, 30c. 200 Columbia Heights, Brooklyn, N. Y.
Class—M. $1, 10c. 537 S. Dearborn St., Chicago, Ill.
Commercial America—M. $3. 34th St., Below Spruce, Philadelphia, Pa.
The Commercial—SM. $2.50. 910 Elec. Ry. Chambers, Winnipeg, Can.
The Drygoodsman—W. $5. 1627 Locust St., St. Louis, Mo.
Editor & Publisher—W. $4, 10c. World Bldg., New York City.
Exclusive Distributor—M. $1.25. Columbus, Ohio.
The Fourth Estate—$4, 10c. 232 W. 59th St., New York City.
General Storekeeper—M. $3. Waukegon, Illinois.
Mail Bag—M. $2, 20c. 1200 West Ninth St., Cleveland, Ohio.
Merchants Journal—W. $2, 10c. 633-5 Jackson St., Topeka, Kansas.
Northwestern Merchant—M. $1.50, 15c. 1261 Empire Bldg., Seattle, Wash.
Novelty News—M. $3, 30c. 980 Clinton St., Chicago, Ill.
Pacific Retailers Journal—M. $1.50, 25c. Portland, Oregon.
Package Advertiser—M. $1. 343 So. Dearborn St., Chicago, Ill.
Postage—M. $2, 25c. 18 East 18th St., N. Y. C.
Poster—M. $3. 28 E. Jackson Blvd., Chicago, Ill.
Printers Ink—W. $5, 10c. 185 Madison Ave., N. Y. C.
Printers Ink Monthly—M. $2, 25c. 185 Madison Ave., N. Y. C.
Retail Selling—M. $1.50, 15c. Box 984, Oklahoma City, Okla.
Sales Management—M. $3, 25c. 1801 Leland Ave., Chicago, Ill.
Signs of the Times—M. $3, 30c 30 Opera Place, Cincinnati, Ohio.
Specially Salesman Mag.—M. $2.50, 25c. Chicago, Ill.
Western Advertising—M. $2, 25c. Pacific Bldg., San Francisco, Cal.

AUTOMOTIVE

Accessory & Garage Journal—M. $2, 20c. Times Bldg., Pawtucket, R. I.
Aerial Age—W. $4. 10c. Foster Bldg., N. Y. C.
Agrimotor—M. $1.50, 25c. 36 S. State St., Chicago, Ill.
American Automobile Digest—M. $2, 20c. Butler Bldg., Cincinnati, O.
American Blacksmith, Auto & Tractor Shop—M. $1, 10c. Buffalo, N. Y.
American Garage & Auto Dealer—M. $1, 10c. 116 S. Michigan Ave., Chicago, Ill.
American Motorist—M. $1, 15c. Riggs Bldg., Washington, D. C.
American Thresherman & Farm Power—M. $1. Madison, Wis.
Automobilist—M. $1.50. 6 Beacon St., Boston, Mass.
Automobile Journal—M. $1.50, 20c. Times Bldg., Pawtucket, R. I.
Automobile Topics—W. $3, 15c 1790 Broadway, N Y. C.
Automobile Trade Journal—M. $2, 40c. Market & 49th Sts., Philadelphia, Pa.
Automotive Industries—W. $3, 35c. 239 W. 39th St., New York City.
Automotive Manufacturer—M. $2. 153 Waverly Pl., New York City.
Auto Review—M. $1. 101 S. 9th St., St. Louis, Mo.
Aviation & Aircraft Journal—W. $4, 15c. 225 4th Ave., N. Y. C.
Aviation & Wireless News—M. $1.50, 15c. 60 Adelaid St. E., Toronto, Canada.
California Ford Owner—M. gratis. 927 S. Hill St., Los Angeles, Cal
Canadian Ford Owner—M. $1.50, 15c. 60 Adelaide St. E., Toronto, Canad
Canadian Implement Trade Journal—M. $1. 105 King St. E., Toronto, Canada.
Canadian Motor Boat—M. $1.50, 15c. 60 Adelaide St. E., Toronto, Canada
Canadian Motorist—M. $2, 15c. 6 Adelaide St. E., Toronto, Canada.
Canadian Motor, Tractor & Implement Trade Jour.— M. $2, 143 University Ave., Toronto, Canada.
Canadian Tire & Accessory Journal—M. 51 Wellington Ave., Toronto, Canada.
Chilton Tractor Journal—M. $1. Market & 49th Sts., Philadelphia, Pa.
Commercial Car Journal—M. $2. Market & 49th Sts., Philadelphia, Pa.
Commercial Vehicle—M. $2, 20c. 239 W. 39th St., N. Y. C.
Farm Mechanics—M. $1, 15c. 1827 Prairie Ave., Chicago, Ill.
Flying—M. $3, 25c. 280 Madison Ave., New York City.
Ford Car Trade Journal—M. $2, 20c. Ellsworth Bldg., Chicago, Ill.
Ford Owner & Dealer—M. $1. Montgomery Bldg., Milwaukee, Wis.
Garage Dealer—M. $1, 10c. Old Colony Bldg., Minneapolis, Minn.
Motor—M. $4, 50c. 119 W. 40th St., New York City.
Motor Age—W. $3, 35c. Mallers Bldg., Chicago, Ill.
Motor Boat—M. $2, 20c. 239 W. 39th St., N. Y. C.
Motor Boating—M. $3, 25c 119 W. 40th St., New York City
Motorcycle & Bicycles—W. $2. 912 Broadway, New York City.
Motordom—M. $1.50. 110 State St., Albany, N. Y.
Motor Guide—M. $1, 15c. Rochester, Ind.
The Motorist—M. $1.50, 15c. Farnam Bldg., Omaha, Neb.
Motor Land—M. $2, 25c. 1628 Van Ness Ave., San Francisco, Cal.
Motor Life—M. $4, 35c. 243 W. 30th St., New York City.
Motor Record—M. $3. 90 West St., New York City.
Motorship—M. $3, 25c. 282 W. 25th St., New York. City
Motor Trade—M. $2. Richmond & Sheppard St., Toronto, Can.
Motor Travel—M. $3, 35c. 305 Washington St., Brooklyn, N. Y.
Motor Truck—M. $2, 20c. Times Bldg., Pawtucket, R. I.
Motor West—S-M. $3, 20c. Marsh-Strong Bldg., Los Angeles, Cal.
Motor World—W. $3, 35c. 239 W. 39th St., New York City.
Power Farming Dealer—M. $1. Wayne St., St. Joseph, Mich.
Pacific Motor Boat—M. $2, 25c. 71 Columbia St., Seattle, Wash.
Power Boating—M. $2, 20c. Penton Bldg., Cleveland, Ohio.
Power Wagon—M. $2, 25c. 544 Lake Shore Drive, Chicago, Ill.
Touring Topics—M. $1, 10c. 1344 S. Figueroa St., Los Angeles, Cal.
Tractor World—M. $2, 20c. Times Bldg., Pawtucket, R. I.
Tractor & Gas Engine Review—M. $1. Madison, Wis.
Western Motor—M. $1.50, 15c. 320 Guardian Trust Bldg., Denver, Col.
Wisconsin Motorist—M. $1, 10c. Montgomery Bldg., Milwaukee, Wis.

BUILDING AND CONSTRUCTION

American Architect—S-M. $6. 243 W. 39th St., New York City.
American Builder—M. $2. 1827 Prairie Ave., Chicago, Ill.
American City—M. $4, 50c. 154 Nassau St., New York City.
American Contractor—W. $10. 11 N. Franklin St., Chicago, Ill.
American Roofer—M. $1. 102 N. Wells St., Chicago, Ill.
Amer. Municipalities—M. $1. Marshalltown, Iowa.
Architect & Engineer—M. $2.50. 626 Foxcraft Bldg., San Francisco, Cal.
Architectural Forum—M. $6, 60c. 142 Berkley St., Boston, Mass.
Architectural Record—M. $3, 35c. 119 W. 40th St., New York City.
Architecture & Building—M. $3, 30c. 23 Warren St., New York City.
Building Age—M. $2, 25c. 912 Broadway, New York City.
Building & Engineering Digest—Bi-W. $3, 15c. Dallas, Tex.
Building & Engineering News—W. $4, 15c. 560 Mission St., San Francisco, Cal.
Building Industry—M. $1, 10c. 421 Caxton Bldg., Cleveland, Ohio.
Builders Journal—M. $2, 25c. 142 Berkley St., Boston, Mass.
Building Materials—M. $1. 314 New Telegraph Bldg., Detroit, Mich.
Building Review—M. $2, 25c. 50 Main St., San Francisco Cal
Buildings & Building Management—S-M. $5. 139 N. Clark St., Chicago, Ill.
Building Supply News—M. $3, 25c. 610 Federal St., Chicago, Ill.
Building Witness—W. $5. Commercial Tribune Bldg., Cincinnati, Ohio
Canadian Engineer—W. $3, 10c. 62 Church St., Toronto, Canada.
Canadian Record & Engineering Review—W. $4, 15c. 347 Adelaide St. W., Toronto, Canada.
Constructor—M. $5, 50c. 1039 Munsey Bldg., Washington, D. C.
Contractors & Engineers Monthly—M. $1, 25c. 154 Nassau St., N. Y. C.
Domestic Engineering—W. $2, 25c. 407 S. Dearborn St., Chicago, Ill.
Engineering News Record—W. $5, 25c. 10th Ave. & 36th St., N. Y. C.
Engineering World—M. $2, 20c. 542 Monadnock Bldg., Chicago, Ill.
Engineering & Contracting—W. $4, 20c. 9 S. Clinton St., Chicago, Ill.
Heating & Ventilating Magazine—M. $2, 25c. 1123 Broadway, N. Y. C.
Highway & Engineering Contractor—W. $2. 542 Monadnock Bldg., Chicago, Ill.
Journal of the American Institute of Architects—M. $5. 320 Fifth Ave., N. Y. C.
Journal of the American Society of Heating & Ventilating Engineers—M. $3, 35c. 29 W. 39th St., N. Y. C.
Journal of the Engineering Institute of Canada—M. 176 Mansfield St., Montreal, Canada.
Journal of the Western Society of Engineers—M. $3, 50c. 53 W. Jackson Blvd., Chicago, Ill.
Keith's Magazine—M. $3. 205 Abbay Bldg., Minneapolis, Minn.
Merchant Plumber & Fitter—S-M. $2, 20c. 200 Fifth Ave., N. Y. C.
Municipal & County Engineering—M. $2, 25c. 702 Wulsin Bldg., Indianapolis, Ind.
National Builder—M. $2, 25c. 542 S. Dearborn St., Chicago, Ill.
National Municipal Review—M. $5, 50c. 261 Broadway, N. Y. C.
Pencil Points—M. $1, 15c. 1 Madison Ave., New York City.
Permanent Builder—M. $2, 35c. 133 W. Washington St., Chicago, Ill.
Plumbers' Trade Journal, Steam & Hot Water Fitters Review—Bi-W. $2. 45 W. 34th St., N. Y. C.
Professional Engineer—M. $2, 20c. 63 E. Adam St., Chicago, Ill.
Roadmaker, Excavator & Grader—M. $1, 15c. 542 Monadnock Bldg., Chicago, Ill.
Sanitary & Heating Engineering—S-M. $2, 10c. 15 E. 40th St., N. Y. C.
Successful Methods—M. 141 Centre St., New York City.
Western Canada Contractor & Builder, 910 Elec. Ry. Chambers, Winnipeg, Canada.
Western Contractor—W. $5. 521 Locust St., Kansas City, Mo.
Western Highway Builder—M. $2, 20c. Marsh-Strong Bldg., Los Angeles, Cal.
Western Plumber—M. $2, 25c. 417 Montgomery St., San Francisco, Cal

CEMENT, STONE, BRICK

Abrasive Industry—M. $2, 25c. Penton Bldg., Cleveland, Ohio.
Brick & Clay Record—S-M. $3. 610 Federal St., Chicago, Ill.
Cement Mill & Quarry—S-M. $2, 15c. 542 Monadnock Bldg., Chicago, Ill.
Clay Worker—M. $2. Indianapolis, Ind.

CEMENT, STONE, BRICK

Concrete—M. $3. Detroit Mich.
Concrete Products—M. $1, 10c. 542 Monadnock Bldg., Chicago, Ill.
Granite, Marble & Bronze—M. $3. 127 Federal St., Boston, Mass.
Monument & Cemetery Review—M. $5, 50c. 1000 Elmwood Ave., Buffalo, N. Y.
Monumental News—M. $3, 50c. 114 S. Carroll St., Madison, Wis.
Pit & Quarry—M. $3, 25c. 538 S. Clark St., Chicago, Ill.
Rock Products—W. $2, 25c. 542 S. Dearborn St., Chicago, Ill.
Stone—M. $2, 20c. 258 Broadway, New York City.

CEREALS & MILLING

American Co-operative Managers—S-M. $1.50. 608 So. Dearborn St., Chicago, Ill.
American Elevator & Grain Trade—M. $1, 15c. 431 So. Dearborn St., Chicago, Ill.
Bakers' Helper—S-M. $2, 20c. 3277 So. La Salle St., Chicago, Ill.
Bakers' Review—M. $2, 20c. 233 Broadway, New York City.
Bakers' Weekly—W. $2. 287 Broadway, New York City.
Country Grain Shipper—M. $1. 324 Fourth Ave., Minneapolis, Minn.
Doings in Grain—M. 25c. 1206 Palar Bldg., Milwaukee, Wis.
Feedingstuff—M. $2. Printing Crafts Bldg., New York City.
Flour & Feed—M. $2, 20c. 304 Montgomery Bldg., Milwaukee, Wis.
Grain Dealers Journal—S-M. $2, 15c. 305 So. La Salle St., Chicago, Ill.
Miller's Review—M. $1, 10c. 1012 Chancellor St., Philadelphia, Pa.
Milling & Grain News—W. $2.50. 315 Merchants Exchange, St. Louis, Mo.
Modern Miller—W. $4. 1341 Insurance Exchange, Chicago, Ill.
National Dealer—M. $2. 411 Walnut St., Philadelphia, Pa.
National Miller—M. $1, 15c. 332 So. La Salle St., Chicago, Ill.
New South Baker—$1. 806 Central Bldg., Atlanta, Ga
Northwestern Miller—W. $5, 15c. 118 So. Sixth St., Minneapolis, Minn.
Pacific Bakery World—M. $1. 228 W. Fourth St., Los Angeles, Cal.
Price Current-Grain Reporter—W. $3, 15c. Traders Bldg., 309 So. La Salle St., Chicago, Ill.
The American Miller—M. $2, 25c. 431 So. Dearborn St., Chicago, Ill.
The Cracker Baker—M. $2. 287 Broadway, New York City.
The Dixie Miller—M. $1, 10c. Atlanta, Ga.
Western Baker—M. $2. 417 Montgomery St., San Francisco, Cal.
Western Grain Journal—S-M. $1.50, 10c. 101 Board of Trade Annex, Kansas City, Mo.

CLOTHING & GARMENTS

American Cloak & Suit Review—M. $2, 25c. 281 Fifth Ave., New York City.
American Fur Buyer—M. $2. 370 Seventh Ave., New York City.
American Hatter—M. $5, 50c. 1182 Broadway, New York City.
Atlantic Coast Merchant—S-M. $3. 239 W. 39th St., New York City.
Black Fox Magazine—M. $2, 25c. 1400 Broadway, New York City.
Boy's Outfitter—M. $2, 25c. 225 Fifth Ave., New York Cty.
Carpet & Upholstery Trade Review—M. $4, 35c. 31 East 17th St., New York City.
Clothier and Furnisher—M. $2, 25c. 13 Astor Place, New York City.
Clothier & Haberdasher—M. $3, 25c. Toronto, Canada.
Clothing Trade Journal—M. $6, 60c. 70 Fifth Ave., New York City.
Corset and Underwear Review—M. $2. 1170 Broadway, New York City.
Daily Garment News—D. $3, 2c. 281 Fifth Ave., New York City.
Decorative Furnisher—M. $3, 30c. 381 Fourth Ave., New York City.
Dress Essentials—M. $2. 1170 Broadway, New York City.
Dry Goods Economist—W. $6. 239 W. 39th St., New York City.
Dry Goods Merchants Trade Journal—M. $3, 35c. Des Moines, Iowa.
Dry Goods Reporter—W. $5. Market and Irving Sts., Chicago, Ill.
Dry Goods Review—M. 144 Union Ave., Toronto, Canada.
Fur News & Outdoor World—M. $1.50. 379 Seventh Ave., New York City.
Fur Trade Review—M. $3. 43 West 29th St., New York City.
Haberdasher—M. $4, 45c. 225 5th Ave., New York City.
House Furnishing Journal—M. $1, 10c. Quincey & Market Sts., Chicago, Ill.
Illustrated Milliner—M. $6, 75c. 656 Broadway, New York City.
Inland Merchant—M. $3, 35c. 25 West 43rd St., New York City.
International Tailor—M. $4, $7. 312 E. 23rd St., New York City.
Lace & Embroidery Review—M. $2. 373 4th Ave., New York City.
Los Angeles Apparel Gazette—M. $1, 10c. 311 East 4th St., Los Angeles, Cal.
Manufacturing Clothier—M. $5, 50c. 13 Astor Pl., New York City.
Men's Wear—S-M. $2, 25c. 8 East 13th St., New York City.
Merchants Journal of Commerce—M. $2. Richmond, Va.
Milliner—M. $3. 215 S. Market St., Chicago, Ill.
Millinery Trade Review—M. $6, 60c. 1182 Broadway, New York City.
National Retail Clothier—S-M. $2. 223 W. Jackson Blvd., Chicago, Ill.
Notion & Novelty Review—M. $1. 1170 Broadway, New York City.
Nugents' The Garment Weekly—W. $5, 25c. 1182 Broadway, New York City.
Pacific Coast Merchant—S-M. $3, 10c. 423 Sacramento St., San Francisco, Cal.
Progressive Tailor—S-A. $3. 315 Fourth Ave., New York City.
Shirt & Undergarment Trade Journal—M. $6, 60c. 70 5th Ave., N. Y. C.
Southern Merchant—M. $2, 20c. Index Bldg., Atlanta, Ga.
Southwestern Drygoods Merchant—M. $2, 25c. Atlanta, Ga.
Sweater News and Outerwear—M. $3, 35c. 321 Broadway, New York City. City.
Underwear & Hosiery Review—M. $3, 35c. 321 Broadway, New York City.
Variety Goods Magazine—M. $2, 25c. Cincinnati, Ohio.
Women's Wear—D. $6, 3c. 8 East 13th St., New York City.

DRUGS & CHEMICALS

American Druggist—M. $2, 25c. 53 Park Place, New York City.
American Fertilizer—S-M. $3. 1010 Arch St., Philadelphia, Pa.
American Globe—M. $1, 15c. 201 American Bank Bldg., Los Angeles, Cal.
American Journal of Pharmacy—M. $3, 30c. 145 N. 10th St., Philadelphia, Pa.
American Paint and Oil Dealer—M. 306 Pontiac Bldg., St. Louis, Mo.
American Paint Journal—W. $2, 10c. 306 Pontiac Bldg., St. Louis, Mo.
American Perfumer & Essential Oil Review—M. $1. 80 Maiden Lane, N. Y. C.
British Columbia Pharmaceutical Record—M. $1. 589 Johnson St., Victoria, B. C., Canada.
Bulletin of Pharmacy—M. $1.50, 15c. 743 Atwater St., Detroit, Mich.
Canadian Chemistry & Metallurgy—M. $3. 57 Queen St. W., Toronto, Canada.
Chicago Retail Druggists' Association News—W. $2, 5c. 31 W. Lake St., Chicago, Ill.
Chemical, Color & Oil Record—SW. $5, 5c. 117 Chambers St., N. Y. C.
Chemical, Color & Oil Daily—D. $10, 5c. 117 Chambers St., N. Y. C.
Chemical & Metallurgical Engineering—W. $5, 25c. 10th Ave. & 36th St., N. Y. C.
Chemical Age—W. $3, 50c. 381 Fourth Ave., New York City.
Commercial Fertilizers—M. $2. 803 Central Bldg., Atlanta Ga.
Drug & Chemical Markets—W. $4, 10c. 3 Park Place, New York City.
Druggist—M. $1, 15c. Memphis, Tenn.
Druggists' Circular—M. $2. 100 William St., New York City.
Drug Store Merchandising—M. $2. 608 S Dearborn St., Chicago, Ill.
Drug Store Topics—M. $1, 10c. 25 City Hall, New York City.
Drug Trade Weekly—W. $3, 10c. 3 Park Pl., N. Y. C.
Embalmers' Monthly—M. $3, 35c. Trade Periodical Co., Chicago, Ill.
Fertilizer Green Book—M. 875 Rand-McNally Bldg., Chicago, Ill.
Journal of the American Pharmaceutical Association—M. $4, 35c. 233 Bourse Bldg., Philadelphia, Pa.
Journal of Biological Chemistry—M. $3. Mt. Royal, Baltimore, Md.
Journal of Industrial and Engineering Chemistry—M. $7.50. 1 Madison Ave., N. Y. C.
Modern Druggist—M. $1, 10c. 401 Godchaux Bldg., New Orleans, La.
Montreal Pharmaceutical Journal—M. $1. 4 St. Lawrence Bldg., Montreal, Canada.
National Association of Retail Druggists Journal—W. $2, 10c. 168 N. Michigan Ave., Chicago, Ill.
Northwestern Druggist—M. $2. 403 Central Bank Bldg., St. Paul, Minn.
Oil Miller—M. $1. Dalton, Ga.
Oil, Paint & Drug Reporter—W. $5. 100 William St., New York City.
Pacific Drug Review—M. $2, 25c. 35 No. Ninth St., Portland, Ore.
Paint, Oil & Chemical Review—W. $3. 610 Federal St., Chicago, Ill.
Pharmaceutical Era—M. $1.25, 15c. 3 Park Place, New York City.
Practical Druggist—M. $1.50, 20c. 93 Nassau St., New York City.
Retail Druggist—M. $1, 15c.. 60 Lafayette Ave., Detroit, Mich.
Standard Remedies—M. $1. 440 S. Dearborn St., Chicago, Ill.
Stirring Rod—M. $2, 25c. 57 Post St., San Francisco, Cal.
Toilet Requisites—M. $2. 225 Fifth Ave., New York City.
Western Druggist—M. $1.50. 536 S. Clark St. Chicago, Ill.

EXPORT

American Exporter—M. $4, 35c. 370 7th Ave., N, Y. C.
Export—M. $5. 50 Church Street, N. Y. C.
Export Trade & Exporters' Review—W. $3, 10c. 280 Broadway, N. Y. C.
Exporters' & Importers' Jl.—W. $5. 17 State Street, N. Y. C.
Journal of Commerce—W. $3. Garden City Press, Gardenvale, P. Q.
U. S. Commerce Reports—W. Bureau of Commerce, Washington, D. C.
World's Markets—M. $2.50, 25c. 290 Broadway, N. Y. C.
World Trade—W. 5, 10c. 330 Sansome St., San Francisco, Cal.

ELECTRICAL

Central Station—M $2. 8 W. 40th St., New York City.
Electrical Contractor Dealer—M. $2, 20c. 15 W. 37th St., N. Y. C.
Electrical Dealer & Contractor—M. $1. 51 Wellington St. W., Toronto, Canada.
Electrical World—W. $5, 25c. 36th St. & 10th Ave, New York City.
Electric Traction—M. $1.50, 25c. 431 S. Dearborn St., Chicago, Ill.
Electrical Merchandising—M. $2, 25c. 36th St. & 10th Ave., N. Y. C.
Electrical News—S-M. $2. 347 Adelaid St. W., Toronto, Can.
Electrical Retailing—M. $1, 10c. Wrigley Bldg., Chicago, Ill.
Electrical South—M. $1. Dalton, Ga.
Electric Journal—M. $2. 1205 Keenan Bldg., Pittsburg, Pa.
Electrical Review—W. $3. 542 Monadnock Bldg., Chicago, Ill.
Journal American Institute of Electrical Engineering—M. $10, $1. 29 W. 39th St., N. Y. C.
Journal of Electricity & Western Industry—Bi-W. $2.50, 25c. Rialto Bldg., San Francisco, Cal.
Jobber's Salesman—M. $1. 53 W. Jackson Blvd., Chicago, Ill.
Lighting Fixtures & Lighting—M. 175 Fifth Ave., N. Y.
Telegraph & Telephone Age—M. $2. 253 Broadway, New York City.
Telephone Engineer—M. $2, 20c. 443 S. Dearborn St., Chicago, Ill.
Telephony—W. $3, 10c. 116 S. Michigan Ave., Chicago, Ill.
Wireless Age—M. $2.50, 25c. 326 Broadway, New York City.

FINANCIAL

American Banker—W. $5, 15c. 67 Pearl Street, N. Y. C.
The Annalist—W. $5, 10c. Times Square, New York City, N. Y.
Banker & Financier—SM. $6. 82 Beaver Street, N. Y. C.
Banker & Manufacturer—M. $5, 50c. Perlos Bldg., 85 Oneida St., Milwaukee, Wis.
Banker & Tradesman—W. $7, 25c. 127 Federal St., Boston, Mass.
Banking Law Journal—M. $5, 50c. 253 Broadway, N. Y. C.
Banker's Magazine—M. $5, 50c. 253 Broadway, N. Y. C.
Bankers Monthly—M. $5, 50c. 536 S. Clark St., Chicago, Ill.
Barron's—M. $10, $1. 44 Broad Street, New York City.
Better Business—M. $1, 15c. 279 Garry St., Winnipeg, Can.
B. C. Trade Review—M. $1, 15c. 510 Hastings St., Vancouver, Canada.
Boston Commercial—W. $4, 10c. 246 Washington St., Boston, Mass.
B. C. Financial Times—S-M. $2.50, 10c. Standard Bank Bldg., Vancouver, B. C.
Burroughs Clearing House—M. Gratis. Burroughs 2, Detroit, Mich.
Canadian Finance—S-M. $2. 47 Aikens Bldg., Winnipeg, Manitoba, Canada.
Coast Banker—M. $10. 576 Sacramento St., San Francisco, Cal.

FINANCIAL

Chicago Banker—W. $5, 10c 431 Dearborn St., Chicago, Ill.
Commerce Finance—W. $5, 15c. 16 Exchange Place, N. Y. C.
Commercial & Financial Chronicle—W. $10. Front, Pine & Dexoyster St., N. Y. C.
The Commercial Digest—SM. $5, 20c. 150 Lafayette Street, N. Y. C.
Commercial West—W. $7, 15c. Globe Bldg., Minneapolis, Minn.
Credit Monthly—M. $3, 25c. 41 Park Row, N. Y. C.
Dun's Review—W. $3, 10c. 290 Broadway, N. Y. C.
The Economist—W. $5, 10c. 112 N. La Salle St., Chicago, Ill.
The Executive—M. $2, 20c. 19 West 44th St., N. Y. C.
Farm Loan & City Bond—M. $2, 20c. 8 S. Dearborn St., Chicago, Ill.
Finance & Industry—W. $5, 15c. Caxton Bldg., Cleveland, Ohio.
Financial Age—W. $5, 10c. 2 Rector St., N. Y. C.
Financial-Insurance News—W. $3. 319 Van Nuys Bldg., Los Angeles, Cal.
Financial Post—W. $5. 143 University Ave., Toronto, Ont., Canada.
Financial Times—W. $3. Montreal, Quebec, Canada.
Financial World—W. $10, 25c. 29 Broadway, N. Y. C.
Forbes Magazine—W. $4, 20c. 120 Fifth Ave., New York City.
Journal of Accountancy, Inc.—M. $4, 35c. 135 Cedar St., N. Y. C.
L. Amer. Bankers Assn.—M. $2, 25c. 5 Nassau St., N. Y. C.
J. Canadian Bankers Assn.—M. Toronto, Canada.
Lawyer & Banker—M. $3. 1587 Hamilton Ave., Detroit, Mich.
Mag. of Wall St.—M. $7.50, 35c. 42 Broadway, N. Y. C.
Mid Continent Banker—M. $3, 35c. St. Louis, Mo.
Montana Banker—M. $3. Tribune Bldg., Gt. Falls, Mont.
Mountain States Banker—M. $3. 324 Labor Theatre Bldg., Denver, Colo.
National Real Estate Journal—Bi-W. $5, 25c. 139 N. Clark St., Chicago, Ill.
New West Trade—W. $2. Spokane, Washington (Realty Bldg.).
North American Bankers Journal of Commerce—M. $5. 58 W. Washington St., Chicago, Ill.
Northwestern Banker—M. $3, 50c. 555 Seventh St., Des Moines, Iowa.
Record & Guide—W. $4, 10c. 127 Federal St., Boston, Mass.
Southern Banker—M. $2, 50c. Candler Bldg., Atlanta, Ga.
Southwestern Bankers Jl.—M. $1. Houston, Texas.
State Banker—M. $1. 316 Mercantile Bldg., Oklahoma City, Okla.
Successful Banking—M. $1. Benton Harbor, Michigan.
U. S. Investor—W. $5. 530 Atlantic Ave., Boston, Mass.
Western Banker of Omaha—M. $3, 25c. Omaha, Nebraska.
Western Financier—M. $3. 201 Commerce Bldg., Kansas City, Mo.

FUEL, COAL AND POWER

Acetylene Journal—M. $1. People's Gas Bldg., Chicago, Ill.
American Coal Miner—M. $1.50, 25c. Lemcke Annex, Indianapolis, Ind.
American Gas Journal—W. $3, 10c. 150 Nassau St., New York City.
Black Diamond—W. $5, 20c. Manhattan Bldg., Chicago, Ill.
Coal Age—W. $3. 10th Ave. & 36th St., New York City.
Coal Association Message—M. $2. Reading, Pa.
Coal Industry—M. $1. 108 Smithfield St., Pittsburg, Pa.
Coal Trade Bulletin—S-M. $3, 25c. 2006 Commonwealth Bldg., Pittsburgh, Pa.
Coal Trade Journal—W. $5. 20 Vesey St., New York City.
Compressed Air Magazine—M. $3, 35c. 11 Broadway, New York City.
Gas Engine—Bi-W. $3, 25c. 52 Vanderbilt Ave., New York City.
Industrial Power—M. Free. 538 S. Dearborn St., Chicago, Ill.
International Steam Engineer—M. $1.50. 6334 Yale Ave., Chicago, Ill.
Manufactured Gas Industry—M. $2. Buffalo, N. Y.
National Engineer—M. $1, 10c. 417 S. Dearborn St., Chicago, Ill.
Natural Gas Industry—M. $2, 20c. Buffalo, N. Y.
Power—W. $3, 15c. 36th St. and 10th Ave., New York City.
Power House—S-M. $2.50. 143 University Ave., Toronto, Canada.
Power Plant Engineering—S-M. $2, 15c. 537 S. Dearborn St., Chicago, Ill.
Retail Coalman—M. $1.50, 25c. 53 W. Jackson Ave., Chicago, Ill.
Southern Engineer—M. 50c, 10c. 102 Grant Bldg., Atlanta, Ga.
Steam—M. $2, 25c. 90 West St., New York City.
Universal Engineers—M. $2, 20c. 150 Nassau St., N. Y. C.
Western Canada Coal Review—M. $2, 20c. Winnipeg, Canada.

GLASS, POTTERY

American Jeweler—M. $1. 607 S. Dearborn St., Chicago, Ill.
China, Glass and Lamps—W. $2. 8th St. and Penn. Ave., Pittsburgh, Pa.
Crockery & Glass Journal—W. $3, 10c. 92 West Broadway, New York.
Glass Industry—M. $2, 20c. 19 Liberty St., New York City.
Glassworker—W. $3. Penn. Ave. & 8th St., Pittsburgh, Pa.
Jewelers' Circular—W. $4. 11 John St., New York City.
Keramic Studios—M. $5, 50c. 531 Clinton St., Syracuse, N. Y.
Keystone—M. $3, 50c. Bourse Bldg., Philadelphia, Pa.
Manufacturing Jeweler—W. $1.50. 42 Weybosset Pl., Providence, R. I.
Midcontinent Jeweler—M. $1, 20c. 1303 Gumbel Bldg., Kansas City, Mo.
National Glass Journal—W. $3. 426 Fourth Ave., Pittsburgh, Pa.
National Jeweler—M. $1.50, 15c. 536 S. Clark St., Chicago, Ill.
Northwestern Jeweler—M. $1, 10c. Albert Lea, Minn.
Optical Age—M. $2, 15c. Bourse Bldg., Philadelphia, Pa.
Optical Journal—W. $2, 10c, 11 John St., New York City.
Pacific Goldsmith—M. $1.50, 15c. 257 Minna St., San Francisco, Cal.
The Trader—M. $4. Richmond and Sheppard St., Toronto, Can.

IRON AND STEEL

Blast Furnace & Steel Plant—M. $2, 25c. Thaw Bldg., Pittsburgh, Pa.
Boiler Maker—M. $3, 35c. 6 E. 39th St., New York City.
Canadian Foundryman—M. $2.50. 143 University Ave., Toronto, Can.
The Foundry—S-M. $3, 25c. Penton Bldg., Cleveland, Ohio.
Iron Age—W. $6, 50c. 239 W. 39th St., New York City.
Iron Trade Review—W. $6, 25c. Penton Bldg., Cleveland, O.
Iron & Steel of Canada—M. $2, 25c. Gardenvale, Quebec, Can.
Transactions of American Society for Steel Treating—4600 Prospect Ave., Cleveland, O.

LABOR

Dodge Idea—M. $5, 50c. Mishawaka, Indiana.
Industrial Management—S-M. $3, 35c. 120 West 32nd Street, N. Y. C.
Labor Age—M. $2, 20c. 41 Union Square, New York City.
The Manufacturer—M. $2, 25c. Salem, Oregon.
Management Engineering—M. $5, 50c. 20 Vesey Street, N. Y. C.
Manufacturers News—W. $4, 15c. 76 W. Monroe Street, Chicago, Ill.
Sabean—M. $3. 1440 Broadway, N. Y. C.

LEATHER & LEATHER PRODUCTS

American Shoemaking—W. $3. 683 Atlantic Ave., Boston, Mass.
Belting—M. $2, 20c. 542 Monadnock Bldg., Chicago, Ill.
Boot & Shoe Recorder—W. $5, 25c. 239 W. 39th St., New York City.
Canadian Harness & Shoe Repair Journal—M. Toronto, Can.
Footwear in Canada—$1.50. Toronto, Can
Glovers Review—M. $1, 10c. Gloversville, N. Y.
Harness—M. $1, 10c. 153 Waverly Place, New York City.
Harness Gazette—M. $1. 11 Liberty St., Utica, N. Y.
Harness Herald—M. $1, 10c. 208 N. Wells St., Chicago, Ill.
Harness World—M. $1.50. 25 Pickering Bldg., Cincinnati, Ohio.
Hide & Leather—W. $5, 15c. 136 W. Lake St., Chicago, Ill.
Leather Manufacturer—M. $3, 25c. 683 Atlantic Ave., Boston, Mass.
Shoe & Leather Facts—M. $1, 10c. 330 Drexel Bldg., Philadelphia, Pa.
Shoe & Leather Journal—S.-M. $2. 549 King St., W. Toronto, Canada.
Shoe & Leather Reporter—W. $6. 116 Essex St., Boston, Mass.
Shoe Findings—$2. 10 High St., Boston, Mass.
Shoe Repair Service—M. $1. Pontiar Bldg., St Louis, Mo.
Shoe Repair Shop—M. $1, 10c. 208 N. Wells St., Chicago, Ill.
Shoe Repairer & Dealer—S-M. $2. 11 High St., Boston, Mass.
Shoe Retailer—W. $3. 116 Essex St., Boston, Mass.
Shoe Topics—W. $2. 207 Essex St., Boston, Mass.
Spokesman—M. $2. 128 Opera Place, Cincinnati, Ohio.
Trunks, Leathergoods & Umbrellas—M. $2. 119 Fourth St., Philadelphia, Pa.
Weekly Bulletin of Leathergoods—W. $3.50, 10c. 183 Essex St., Boston, Mass.

LUMBER & WOOD PRODUCTS

American Forestry Ass'n—M. $4, 40c. 1214 E. 16th St., Washington, D. C.
American Furniture Mftr—M. $1, 10c. 537 S. Dearborn St., Chicago, Ill.
Barrel & Box—M. $2, 20c. 537 S. Dearborn St., Chicago, Ill.
Brooms, Brushes & Handles—M. $1. 501 Montgomery Bldg., Milwaukee, Wis.
Canada Lumberman—S-M. $2, 20c. 347 Adelaide St. W., Toronto, Canada.
Canadian Furniture World—M. $1.50 (Can.) $2 (U.S.). 51 Wellington St., Toronto, Canada.
Canadian Wood Worker—M. $2.50. 345 Adelaide St. W., Toronto, Canada.
Furniture Age—M. $2, 25c. 4828 Sheridan Rd., Chicago, Ill.
Furniture Index—M. $2. Jamestown, N. Y., Robert's Bldg.
Furniture Journal—M. $3. 537 So. Dearborn St., Chicago, Ill.
Furniture Mftr. & Artisan—M. $2, 20c. Ottawa Ave. & Pearl St. N. W., Grand Rapids, Mich.
Furniture Merchants Trade J.—M. $3, 35c. 7th & Grand, Des Moines, Iowa.
Furniture Worker—M. $2. 1280 Fera Pl., Cincinnati, Ohio.
Grand Rapids Furniture Record—M. $3, 30c. Grand Rapids, Mich. (Kelsey Bldg.).
Hardwood Record—S-M. $2. 537 So. Dearborn St., Chicago, Ill.
Lumber—W. $5, 25c. 1020 S. Wabash Ave., Chicago, Ill.
Lumber World Review—S.-M. $3, 25c. 608 S. Dearborn St., Chicago, Ill.
Lumberman's Review—M. $2. 101 Park Ave., N. Y. C.
Lumber Trade Journal—S-M. $2.50, 15c. New Orleans, La.
Mississippi Valley Lumberman—W. $3.50. Lumber Exchange Bldg., Minneapolis, Minn.
New York Lumber Trade Jl.—S-M. $3, 15c. 18 Broadway, N. Y. C.
Packages—M. $2, 20c. Milwaukee, Wis.
Retail Lumberman—S-M. $1. 520 R. A. Long Bldg., Kansas City, Mo.
Southern Furniture Journal—M. $1. High Point, N. C.
Southern Lumberman—W. $5, 20c. Presbyterian Bldg., Nashville, Tenn.
The Timberman—S-M. $3, 20c. Spaulding Bldg., Portland, Ore.
Veneers—M. $1. 701 Wilson Bldg., Indianapolis, Ind.
Western Lumberman—M. $2.50, 20c. 347 Adelaide St., W. Toronto, Canada.
Wood Turning—$2, 20c. 501 Montgomery Bldg., Milwaukee, Wis.
Wood Worker—$2. 701 Wilson Bldg., Indianapolis, Ind.

MACHINERY AND MACHINE PRODUCTS

American Machine & Tool Record—M. $1. 542 Monadnock Bldg., Chicago, Ill.
American Machinist—W. $5, 25c. 10th Ave. and 36th St., New York City.
Canadian Farm Implements—M. $1, 10c. 812 Confederation Life Bldg., Winnipeg, Canada.
Canadian Machinery & Manufacturing News—W. $4.50. 143 University Ave., Toronto, Can.
Eastern Dealer in Implements & Vehicles—S-M. $2. 1017 Drexel Bldg., Philadelphia, Pa.
Farm Implements & Tractors—M. $1, 10c. 1018 Lumber Exchange, Minneapolis, Minn.
Farm Implement News—W. $2, 10c, Masonic Temple, Chicago, Ill.
Farm Machinery & Farm Power—S-M. $1, 5c. St. Louis, Mo.
Hardware and Implement Jounal—S-M. $2, 10c. 188 Main St., Dallas, Tex.
Hardware Age—W. $3, 25c. 239 W. 39th St., N. Y. C.
Implement & Tractor Age—S-M. $1, 10c. 30 Kelly Bldg., Springfield, O.
Implement & Tractor Trade Journal—W. $2. 10th and Wyandotte, Kansas City, Mo.

MACHINERY AND MACHINE PRODUCTS

Implement Record—M. 50c. St. Louis, Mo.
Machinery—M. $3, 35c. 140 Lafayette St., New York City.
Mechanical Engineering—M. $4, 50c. 29 W. 39th St., New York City.
Mill Supplies—M. $1, 15c. 537 So. Dearborn St., Chicago, Ill.
Office Appliances—M. $2, 20c. 417 So. Dearborn St., Chicago, Ill.
Scale Journal—M. $2, 20c. 608 S. Dearborn St., Chicago, Ill.
Typewriter Topics—M. $2, 20c. 302 Broadway, New York City.

MANAGEMENT

American Cooperative Manager—S.-M. 608 South Dearborn St., Chicago, Ill.
Canadian Manufacturer—M. $2. 51 Wellington West, Toronto, Canada
Factory—S-M. 15, 25c. Cass, Huror & Erie St., Chicago, Ill.
Filing & Office Management—$2, 20c. 320 Broadway, N. Y. C
Management Engineering—M. $5, 50c. 30 Vesey Street, New York City.
Manufacturers Record—W. $6.50, 20c. Baltimore, Maryland.
Pacific Factory Developer—M. $2, 25c. 528 Call Bldg., San Francisco, Cal.
Purchasing Agent—M. $2, 20c. 19 Park Place, N. Y. C.
Public Service Management—M. $3, 25c. 431 So. Dearborn St., Chicago, Ill.
Safety Engineering—M. $3, 25c. 126 Maiden Lane N. Y. C
The Silent Partner—M. $1.50, 15c. 200 Fifth Ave., New York City.
Trained Men—M. $1. Scranton, Pa.

METALS & METAL PRODUCTS

American Zinc, Lead & Copper Journal—M. $1.50, 15c. Joplin, Mo.
Brass World—M. $1, 15c. 153 Waverly Place, New York City.
Forge & Heat Treating—M. $2, 25c. 108 Smithfield St., Pittsburg, Pa.
Metal Industry—M. $1, 10c. 99 John St., New York City.
Raw Materials—M. $3, 35c. 461 Eighth Ave., New York City.
Sheet Metal Worker—S-M. $3. 15 E. 40th St., New York City.
Steel & Metal Digest—M. $2, 20c. 81 Fulton St., New York City.
Warm Air Heating & Sheet Metal Journal—M. $1. 261 So. Fourth Ave., Philadelphia, Pa.
Welding Engineer—M. $3, 20c. 608 So. Dearborn St., Chicago, Ill.

MINING & METALLURGY

Arizona Mining Journal—S-M. $3. Phoenix, Arizona.
Canada Mining Journal—W. $5, 15c. Gardenvale, P. Q.
Engineering & Mining Journal-Press—W. $5, 25c. 10th Ave. and 36th St., New York City.
Journal of American Institute of Mining Engineers—M.
Northwestern Mining Truth—S-M. $3, 25c. 612 Mohawk Bldg., Spokane, Washington.
Salt Lake Mining Review—S-M. $2.50, 25c. Walker Bldg., Salt Lake City, Utah.

OILS & PETROLEUM

California Oil World—W. $7.80, 15c. San Fernande Bldg., Los Angeles, Cal.
Lubrication World—M. $2. Chicago, Ill.
Mining & Oil Bulletin—M. $2.50 25c. 206 So. Spring St., Los Angeles, Cal.
National Petroleum News—W. $5, 25c. 812 Huron Road, Cleveland, O.
Oildom—M. $3, 35c. Woolworth Bldg., New York City.
Oil Age—M. $3, 25c. Textile Insurance Bldg., Los Angeles, Cal.
Oil Field Engineering—M. $2, 25c. 415 Pioneer St., Cincinnati, Ohio.
Oil News—Bi. W. $4. Galesburg, Ill.
Oil Trade Journal—M. $4, 35c. 120 Broadway. New York City.
Oil Weekly—W. $5. Houston, Tex.
Petroleum Age—S-M. $3, 35c. 28 E. Jackson Boulevard, Chicago, Ill.
Petroleum Record—M. $3, 25c. Stock Exchange Bldg., Los Angeles, Cal.
Petroleum World—M. $3, 25c. Marsh Strong Bldg., Los Angeles, Cal.

PRINTING & PUBLISHING

American Pressman—M. $2. Pressman's Home, Tenn.
American Printer—S-M. $4, 20c. 239 W. 39th St., New York City.
Ben Franklin Monthly—M. $2, 20c. 440 S. Dearborn St., Chicago, Ill.
Bookseller, Newsdealer & Stationer—S-M. 156 Fifth Ave., N. Y. C.
Canadian Printer & Publisher—M. $3.50. Toronto, Canada.
Crowleys Magazine—$1, 10c. 511 E. 164th St., New York City.
Editor & Publisher—W. $4, 10c. World Bldg., New York City.
The Fourth Estate—$4, 10c. 232 W. 59th St., New York City.
Inland Printer—M. $4, 40c. 632 Sherman St., Chicago, Ill.
Library Journal—S-M. $5, 25c. 62 West 45th St., New York City.
National Lithographer—M. $3. 150 Nassau St., New York City.
Printing—W. $4. 41 Park Row, New York City.
Printing Art—$4, 40c. Cambridge, Mass.
Public Libraries—M. $2, 35c. 6 N. Michigan Ave., Chicago, Ill.
Publishers' Auxiliary—W. $2, 5c. 210 So. Desplaines St., Chicago, Ill.
Publishers' Weekly—W. $6. 62 West 45th St., New York City.
Special Libraries—M. $4, 50c. 20 Vesey St., New York City.
Waldens' Stationer & Printer—M. $2, 25c. 41 Park Row, New York City.

PULP AND PAPER PRODUCTS

American Paper Merchant—M. $3, 25c. 440 S. Dearborn St., Chicago, Ill.
American Stationer and Office Outfitter—M. $2. 10 East 39th St., N. Y. C.
Carton Age—M. $2, 20c. 343 S. Dearborn St., Chicago, Ill.
Fiber Container—M. $2, 30c. 343 S. Dearborn St., Chicago, Ill.
Geyer's Stationer—M. $2.50. 175 Fifth Ave., N. Y. C.
Pacific Stationer—M. $1, 10c. 257 Minna St., San Francisco, Cal.
Package Advertiser—M. $1, 10c. 343 S. Dearborn St., Chicago, Ill.
Paper—W. $5, 25c. 251 West 19th St., N. Y. C.
Paper Industry—M. $2, 20c. 356 Monadnock Block, Chicago, Ill.
Paper Mill & Wood Pulp News—W. $4, 10c. 154 Nassau St., N. Y. C.
Paper Trade Journal—W. $4, 10c. 10 E. 38th St., N. Y. C.
Pulp and Paper Magazine—W. $5, 15c. Gardenville, Canada.
Wall Paper—M. $1, 10c. 132 West 42nd St., N. Y. C.

RUBBER & PLASTICS

India Rubber World—M. $3, 35c. 25 W. 45th St., New York City.
Rubber—M. $2. 1157 Leader-News Bldg., Cleveland, Ohio.
Rubber Age—S-M. $2, 10c. 225 Fourth Ave., New York City.
Tires—M. $2, 20c. 373 Fourth Ave., New York City.
Tire & Trade Journal, etc.—M. $2. 225 4th Ave., N. Y. C.

SUGAR & CONFECTIONERY

Candy & Ice Cream—M. 2. Wrigley Bldg., 400 No. Michigan Ave., Chicago, Ill.
Candy Jobber—M. $1, 10c. Wrigley Bldg., Chicago, Ill.
Confectioners' Gazette—M. $2. 366 Broadway, New York City.
Confectioners' Journal—M. $3, 3c. 411 Walnut St., Philadelphia, Pa.
Confectionery Merchandising—M. $2, 25c. 608 W. Dearborn St., Chicago, Ill.
Facts About Sugar—W. $3, 10c. 82 Wall St., N. Y. C.
Fountain Profits—M. $1. 510 Stock Exchange Bldg., Portland, Ore.
Ice Cream Review—M. $2. 210 Sycamore St., Milwaukee, Wis.
Ice Cream Trade Journal—M. $2, 20c. 171 Madison Ave., New York City.
International Confectioner—M. $2.50, 25c. 621 Broadway, New York City.
Louisiana Planter—W. $3. 407 Carondelet St., New Orleans, La.
Northwestern Confectioner—M. $2, 20c. 405 Broadway, New York City.
Soda Dispenser—M. 50c. 623 Hurt Bldg., Atlanta, Ga
Soda Fountain—M. $1.25. 3 Park Place, New York City.
Soft Drink Journal & The Bottlers' Review—M. $2, 20c. 153 Waverly Place, New York City.
Sugar—M. $2, 25c. 153 Waverly Place, New York City.
Sweets—M. $1. 806 Central Bldg., Atlanta, Ga.
Western Confectioner—M. $3, 35c. 57 Post St., San Francisco, Cal.

TEXTILES

American Carpet & Upholstery Journal—M. $2, 25c. 1010 Drexel Bldg., Philadelphia, Pa.
American Dyestuff Reporter—M. $5. 4109 Woolworth Bldg., New York City
American Silk Journal—M. $3. 373 Fourth Ave., New York City.
American Wool & Cotton Report—W. $3. 530 Atlantic Ave., Boston, Mass.
Asbestos—$1, 20c. 721 Bulletin Bldg., Philadelphia, Pa.
Canadian Dyer & Color User—M. $3. 57 Queen St. West, Toronto, Canada.
Canadian Textile Journal—S-M. $3. Gardenville, P. Q.
Carpet & Rug News—M. $1. 373 Fourth Ave., New York City.
Cleaning & Dyeing World—M. $2, 20c. 803 W. Madison St., Chicago, Ill.
Cleaners & Dyers Review—M. $2, 20c. 128 Opera Pl., Cincinnati, Ohio.
Color Trade Journal—M. $5, 50c. 103 Park Ave., New York City.
Cotton—M. $1. Grant Bldg., Atlanta, Ga.
Cotton & Cotton Oil News—M. $3, 10c. 1802 Jackson St., Dallas Texas.
Cotton Mill News—W. $2. 206 E. Fifth St., Charlotte, N. C.
Fiber & Fabric—W. $2. 127 Federal St., Boston, Mass.
National Cleaner & Dyer—M. $2, 20c. 120-4 Ann St., Chicago, Ill.
National Laundry Journal—S-M. $2, 10c. 120 Ann St., Chicago, Ill.
Pacific Laundry Journal—M. $3. 417 Montgomery St., San Francisco, Cal
Price's Carpet & Rug News—M. $1. 373 Fourth Ave., New York City.
Silk—M. $2, 25c. 1123 Broadway, N. Y. C.
Southern Textile Bulletin—W. $2. 39 S. Church St., Charlotte, N. C.
Starchroom Laundry Journal—M. $3. 415 Pioneer St., Cincinnati, Ohio.
Textile American—M. $2, 20c. Old South Bldg., Boston, Mass.
Textile Colorist—M. $5. 53 Park Place, New York City.
Textiles—M. $2. 1170 Broadway, N. Y. C.
Textile World—W. $4, East of Miss. $5, West. 334 Fourth Ave., N. Y. C
Upholsterer—M. $3, 25c. 373 Fourth Ave., N. Y. C.

TRANSPORTATION

Better Roads & Streets—$3. 240 West 50th St., Dayton, Ohio.
Canadian Railway & Marine World—M. $2, 25c. 70 Bond St., Toronto, Can.
Distribution & Warehousing—M. $2, 20c. 239 W. 39th St., N. Y. C.
Electric Railway Journal—W. $4, 20c. 36th St. & 10th Ave., N. Y. C.
Express Gazette Journal—M. $2, 20c. 51 Broadway, N. Y. C.
Gulf Marine Register—M. $1.50, 25c. New Orleans, La.
Marine Engineering—M. $2.50, 25c. Woolworth Bldg., N. Y. C.
Marine Journal—W. $6.00, 15c. Liberty St., Terminal Bldg., N. Y. C.
National Marine—M. $5.00, 50c. 268 Pearl St., N. Y. C.
Nautical Gazette—W. $4, 15c. 20 Vesey St., N. Y. C.
Nauticus—W. $5, 15c. 109 Broad St., N. Y. C.
Pacific Ports—M. $4, 35c. Central Bldg., Seattle, Washington.
Pan Pacific—M. $5, 50c. 40 California St., San Francisco, Cal.
Railway Age—W. $5, 20c. Woolworth Bldg., N. Y. C.
Railway Journal—M. $1, 10c. 327 S. La Salle St., Chicago, Ill.
Railway Locomotive Engineering—M. $2, 20c. 114 Liberty St., N. Y. C.
Railway Maintenance Engineering—M. $3, 35c. Transportation Bldg., Chicago Illinois.
Railway Review—W. $4. 537 So. Dearborn St., Chicago, Ill.
Railway Signal Engineer—M. Transportation Bldg., Chicago, Illinois.
The Rudder—M. $2, 25c. 9 Murray St., N. Y. C.
Shipping—S-M. $4, 20c. 82 Beaver St., N. Y. C.
Shippers' Advocate—S-M. $3. 11 Water Street, N. Y. C.
Traffic Service Corp.—$10. 418 Market St., Chicago, Illinois.
World Trade—W. $5. 330 Sansome St., San Francisco, Cal.

GENERAL

Lefax—M. $2. 9th & Sansom St., Phila., Pa.
The Manchester Guardian Commercial—W. 18 shillings, 3 pence. Guardian Bldg., Manchester, England.
Nation's Business—M. $3, 25c. Mills Bldg., Washington, D. C.
Retail Ledger—SM. $3, 15c. Philadelphia, Pa.
World's Work—M. $4, 35c. 120 West 32d Street, New York City.

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The book, "Essentials of Industrial Costing," points the way. It tells of tried and proved methods by which the cost of production is derived, and shows how the most advanced industrial leaders keep their manufacturing costs down to minimum, chiefly by reason of their knowing the correct way to figure all the elements of costs, based on sound principles. This book, written by George S. Armstrong, should be read by every business executive now beset by falling profits on the one hand and stubbornly steady production costs on the other. This, and thousands of other equally good books, can be obtained from The Industrial Digest. "Essentials of Industrial Costing" costs only $5, postpaid. It contains 297 pp. of valuable facts.

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The INDUSTRIAL CALENDAR

Secretaries of Associations are invited to send us the dates of their conventions as early as possible so that their conventions may be properly listed below. When especially requested by Association Secretaries, we will send dates and other available notices concerning meetings of other associations.

June 26-27. *National Ornamental Glass Mfrs. Assn.,* Cincinnati, O. (C. C. Jacoby, Secretary, 2700 St. Vincent Ave., St. Louis, Mo.)

June 26-30. *American Institute of Electrical Engineers,* Niagara Falls, Ont. (29 W. 39th St., New York City.)

June 26-July 1. *American Society for Testing Materials,* Chalfonte-Haddon Hall Hotel, Atlantic City, N. J. (C. L. Warwick, Secretary, 1315 Spruce St., Philadelphia.)

June 27-29. *Canadian Assn. of Stationary Engineers,* Kitchener, Ontario. (G. C. Keith, 51 Wellington St., West, Toronto, Ontario.)

June 28-29. *American Association of General Baggage Agents,* Minneapolis, Minn. (E. L. Duncan, 332 South Michigan Ave., Chicago, Ill.)

July 9-12. *International Association, Display Men,* Chicago, Ill. (L. A. Rogers, Secretary, John D. Mabley Co., Detroit, Mich.)

July 10-15. *Export & Import Exposition,* Baltimore, Md. (A. E. MacKinnon, 405 Lexington Ave., New York.)

July 12-14. *National Assn. of Stationary Engineers,* Springfield, Mass. (James Morgan, 53 Devonshire St., Boston, Mass.)

July 16. *American Institute of Banking,* Portland, Ore. (R. W. Hill, Secretary, 5 Nassau St., New York.)

July 19-21. *National Assn. of Stationary Engineers,* Kalamazoo, Mich. (A. M. Adams, 1307 Stockbridge Ave., Kalamazoo, Mich.)

July 25-28. *National Retail Tea & Coffee Merchants Assn.,* Hotel Statler, Detroit, Mich. (R. M. Heizer, Secretary, 1201 Cornell Ave., Indianapolis, Ind.)

Aug. 23-25. *American Association of Railroad Superintendents,* Kansas City, Mo. (J. Rothschild, 400 Union Station, St. Louis, Mo.)

Aug. 28-Sept. 2. *National Safety Council,* Detroit, Mich. (S. J. Wiliams, Sec., 168 N. Michigan Ave., Chicago, Ill.)

Sept. 4-9. *Gas and Fuel Section of the American Chemical Society,* Pittsburgh, Pa. (Dr. R. S. McBride, Secretary, Colorado Bldg., Washington, D.C.)

Sept. 11-15. *Association of Iron and Steel Electrical Engineers,* Cleveland. (J. F. Kelly, Secretary, Empire Bldg., Pittsburgh.)

Sept. 11-16. *Bakery Equipment and Material Exposition,* Municipal Pier, Chicago, Ill. (B. M. Warner, Secretary, Conway Bldg., Chicago, Ill.)

Sept. 12-14. *Retail Bakers of America, Chicago.* (J. M. Hartley, Secretary, 10 S. La Salle St., Chicago.)

Sept. 12-15. *American Bakers Assn., Chicago.* (H. E. Barnard, Secretary, 1135 Fulliton Ave., Chicago, Ill.)

Sept. 25-29. *National Association Retail Druggists,* Detroit, Mich. (S. C. Henry, Secretary, 168 N. Mich Blvd., Chicago, Ill.)

Sept. 25-30. *National Association Advertising Specialty Mfrs.,* Chicago, Ill. (B. Blackwood, Secretary, 208 S. LaSalle St., Chicago, Ill.)

Oct. *American Electric Railway Association,* Chicago, Ill. (J. W. Welsh, 8 West 40th St., New York.)

Oct. 2-6. *American Bankers Association,* Hotel Commodore, New York. (W. G. Fitzwilson, Secretary, 5 Nassau St., New York City.)

Oct. 2-7. *American Society for Steel Treating, International Steel Convention,* General Motors Bldg., Detroit, Mich. (W. H. Eisenman, Secretary, 4600 Prospect Ave., Cleveland, Ohio.)

Oct. 11. *National Association Electrical Contractors and Dirs.,* Cincinati, Ohio. (W. H. Morton, Secretary, 15 W. 37th St., N. Y. C.)

Oct. 11-13. *National Federation of Implement Dealers' Association,* Chicago, Ill. (H. J. Hodge, Secretary, Abilene, Kan.)

Oct. 11-14. *Pacific Coast Logging Congress,* Tacoma, Wash.

Oct. 17-19. *American Railway Bridge and Building Association,* Cincinnati, Ohio. (C. R. Lichty, Chicago & North Western Ry., 219 North Waller Ave., Chicago, Ill.)

Oct. 18-20. *National Association Farm Equipment Mfrs.,* Chicago, Ill.

Foreign Events

June to November. *French Colonial Products,* Marseilles, France.

June 24-Sept. 15. *Annual Exhibition of Ceramics and Glassware,* Dresden, Germany.

July. *Second Near East Sample Fair.* New exposition buildings being erected along the Danube.

July 1-24. *Aircraft Exhibition,* London, England.

July 9. *Universal Exhibition,* Buenos Aires, Argentina.

July 24-29. *International Tobacco Trade Exhibition and Conference,* London, England.

Aug. *Second Sample Fair,* Lublyana (Leibach), Yugoslavia.

Aug. 12-20. *Third Annual Sample Fair,* Liberee (Reichenberg), Czechoslovakia.

Aug. 27-Sept. 2. *Autumn Fair,* Leipzig, Germany.

Sept. *International Exposition (centennial),* Rio de Janeiro, Brazil.

Sept. 15. *International Fair,* Bandoeng (Java).

Sept. 18-23. *International Chamber of Commerce,* Rome, Italy.

Sept. 21. *Textile Fair,* Hamburg, Germany.

Sept. 25-Oct. 3. *Automobile Show* at the Kaiserdamm Hall, Berlin, Germany.

Oct. 1-15. *General International,* Lyons.

Oct. 4-15. *Automobile Show,* Grand Palais, Paris, France.

Oct. 12-23. *International Commercial Vehicle Exhibition* at Olympia, London, England.

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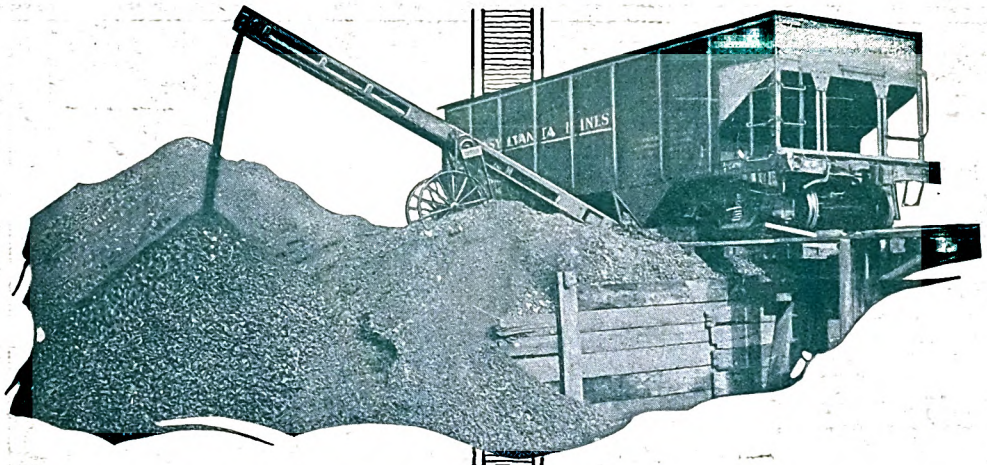
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When loading from piles the "Scoop" end is pushed or buried right into the pile, making it very easy for one man to scrape the coal onto the belt to its full capacity of a ton a minute.

For Storing, reclaiming or transferring; the most flexible kind of a conveying system can be built by using two or more of these machines in tandem style, one feeding the other. Each machine being complete in itself and easily portable, can be used separately at any time.

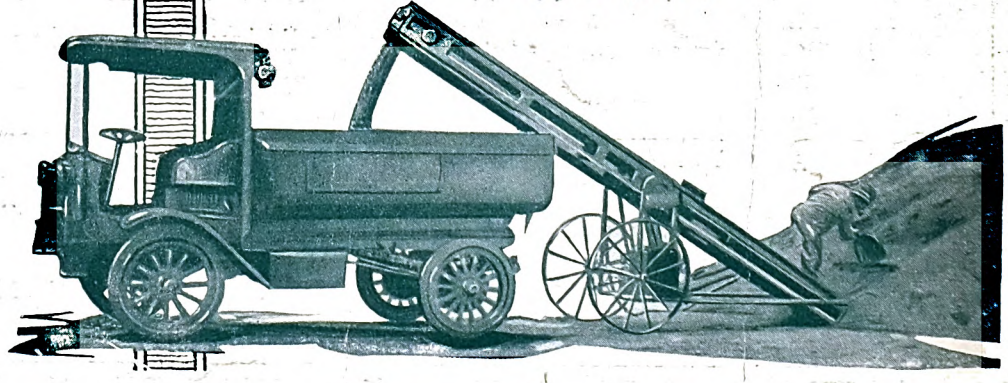
Over 5,000 Scoop Conveyors are in daily use. Write for catalog No. 51, showing how they reduce handling costs.

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Portable Machinery Co.

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JUL 11 192

The INDUSTRIAL DIGEST

July 8

25 Cents

v.1 no.18



What's Wrong With Our Coal Industry?

See page 1198

Do You Want A Basis For "Scientific Profit Making"?

Out of our long experience of the past, we have developed a fundamental service, which reconciles accounting and costing with sound industrial economics.

It is a service which will enable an Executive to more intelligently and efficiently operate the complex business machinery of his Concern.

This service is built around these elements—

1—Proportioning Profits to Complexity and Effort Expended in Producing Goods.

2—Determining Scientific Prices through consideration of Plant Capacity Factors.

3—Reconciling Differences between Market and Cost Values of Materials.

4—Eliminating Waste Factors from Direct Costs.

5—Separating Profits or Losses due to Volume and Purchasing, which are cyclical factors, from Operating, which is a yearly proposition reflecting the efficiency and economy of Manufacturing.

We can demonstrate to your satisfaction, the economic and commercial soundness of these five points.

Send for a specification of this service, a statement of the economies behind it and the results possible through its use; also a list of 14 questions, the answers to which will demonstrate to you whether you have a "scientific profit making" basis or not.

If the answers are "No," as many of them are likely to be, you NEED this service, and need it NOW.

We have yet to find a single case where all of the five points mentioned are in use.

Other services of importance to industry at this time are—

"Waste Elimination Week" *"Technical Savings Sharing"*

May we tell you in person about our latest plans for rendering counseling and advisory assistance?

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THE INDUSTRIAL DIGEST

A fortnightly digest of
the informative articles in
six hundred leading industrial
magazines covering thirty industries

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"Open Sesame!"

ALI BABA murmured the magic words, the cavern door swung open and costly treasures lay at his feet.

You, too, have an "open sesame" to the treasures of the world. It is *advertising.*

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Advertising is far too important to be overlooked.



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Endorses Estes Service

A. E. ALTENBERG President of the Icy-Hot Bottle Company of Cincinnati says:

Production Increase—20%

Decrease in Labor Turnover—20%

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"One development in particular, due to Estes' Service, meant much to us—and that was a training department where green men were taught to be skilled glass workers. This insured us of a steady supply of trained men. Formerly, when an expert glass worker became sick, we lost production, but after the training school had been installed, the expert's place was at least partially filled by one or two of the students.

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INDUSTRIAL ENGINEERS

Costs **Accounting**

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Vol. 1
No. 18

THE INDUSTRIAL DIGEST

July 8
1922



The Business Weathervane

A Summary of Expert Opinion

"The status of general business has not changed much during the week, but evidence of further improvement is not lacking. Progress would be more rapid if labor troubles were not present in some important industries, yet gains this year have been substantial and the decidedly stronger fundamental conditions promise well for the future," says **Dun's Review.** "While competition for business is still keen in different lines, the initiative in most transactions is no longer with the seller, and pressure for deliveries has become sufficiently urgent in certain instances to result in premiums being established on quick shipments. With advances predominating on **Dun's** list of wholesale quotations during 20 of the last 25 weeks, the reaction from previous price depression has clearly been decisive, and the prospect of higher levels to follow now influences the buying policy in some markets."

The important factor at the present time is the money rate, but opinion differs as to the probable future trend of money. According to the **United States Business Service,** "Money is a great governing factor behind a bull market, and at the moment the banking outlook holds no indication of any untoward circumstances which might force a tightening of money. Money conditions are excellent, and when easy money is to be found in conjunction with business recovery it should be a fair assumption that the stock market will not start its long downward trend until a point is reached where business makes a sufficiently heavy demand upon the money market to cause stocks to suffer through lack of available call funds in the call market. Call money today is very cheap, and interest rates are expected to continue downward during the summer, probably reaching their minimum low some time in September."

On the other hand, the **Times Annalist** points out: "There is more evidence now of business expansion, and if this continues it is not unlikely that before long the demands of business may be felt to an increasing extent in the money market, with the result that rates may show something of a hardening tendency from now on. If money is to begin to flow into industrial activities, then it may be expected that the stock market will, as time goes on, feel the pinch for funds when there is any pronounced upturn in brokerage borrowings. In so far as car loadings are an index to business recovery, the record for the week ended June 10 shows a decidedly encouraging situation. The total of 846,002 is an increase of 95,357 over the preceding week, and 58,719 over the corresponding week of 1921. The significant fact in connection with the loadings is that the total for the week of June 10 came within 33 cars of the largest loadings for any week this year. Also, it was worth while noting that the loadings of coal amounted to 94,824 cars, a figure which is larger than for any previous week since the coal strike started. If coal loadings were within range of normal, total loadings would reach a figure close to the high point of 1920."

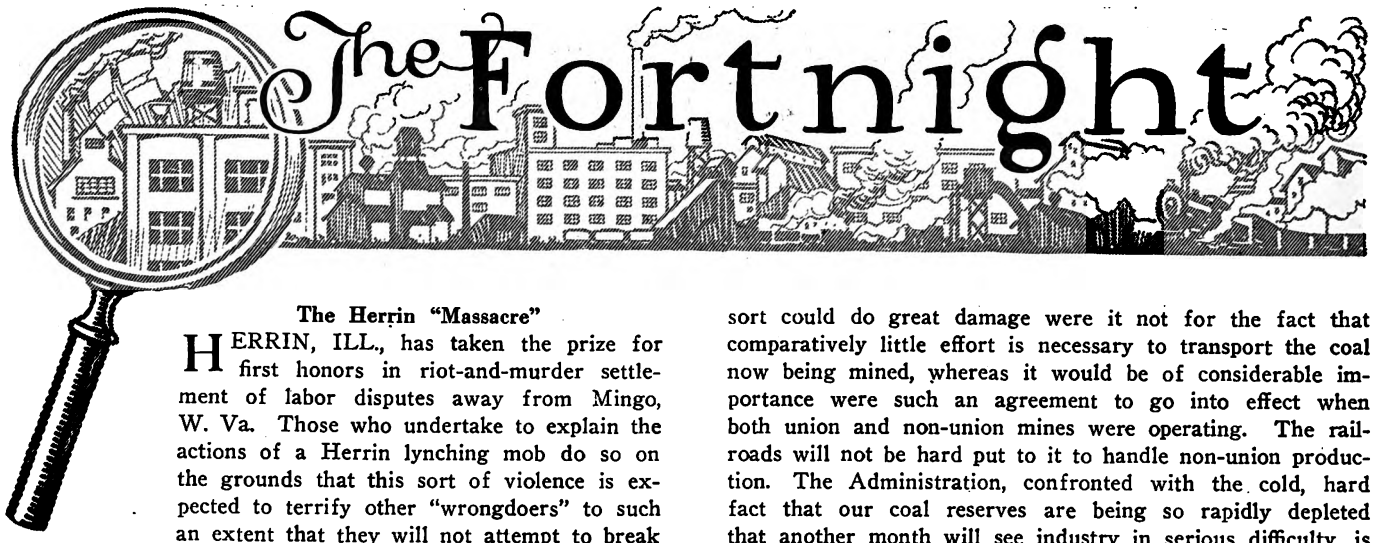


(Newark Evening News)

Just as he was getting back to earth.

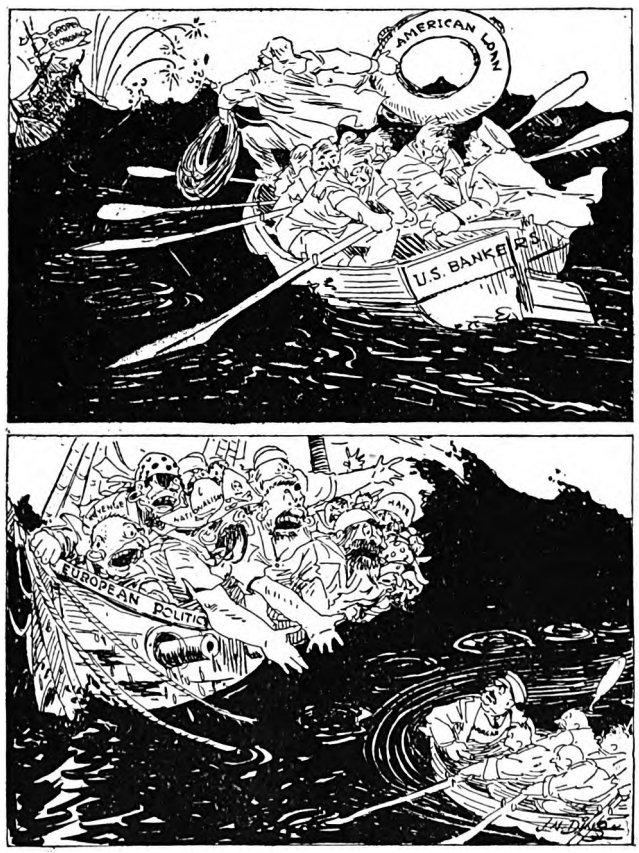
According to the **National Industrial Conference Board,** "Business conditions continue to improve and the number of industries reporting betterment is greater than in previous months. In some instances orders placed show a decline. Nevertheless, confidence generally continues and the feeling grows steadily that the country is at last beginning to emerge from the depression. The number of business failures shows an appreciable decline. In January, 1922, the number of failures was 2,723; in February, 2,331; in March, 2,463; in April, 2,167; and in May, 1,960. Wholesale prices have shown an upward trend. Retail food prices showed no change between April 15 and May 15, 1922. The studies of the Board indicate that the cost of living on May 15, 1922, was 54.9% above that in July, 1914."





The Herrin "Massacre"

HERRIN, ILL., has taken the prize for first honors in riot-and-murder settlement of labor disputes away from Mingo, W. Va. Those who undertake to explain the actions of a Herrin lynching mob do so on the grounds that this sort of violence is expected to terrify other "wrongdoers" to such an extent that they will not attempt to break the law. But there can be no such explanation in the case of the Herrin strikers, because there was no lawbreaking concerned. Nor was there any possibility that acts of violence such as were performed there could by any chance put the workers on better terms with the company than a hands-off policy. As one publication expressed it, union labor has stabbed itself and unless this sort of thing stops completely union labor may bleed to death. Public opinion will not stand for a repetition of the Herrin massacre, no matter who is to blame. Each side naturally blames its opponent for the trouble, and there could hardly be a crisis so acute as this without a good deal of blame for both parties to the conflict. Whatever the trouble, it should be settled once and for all.



(Philadelphia North American)

Too Tough a Proposition Even for a Lifeguard

The Railroad Strike

AS if to prove that union labor has not had its share of strikes in the last six months, along comes the railroad strike, which began on July 1. At this writing it is impossible to tell how far the trouble will develop, but it is impossible for the rail unions to gain anything by the strike at this time, according to most editors.

President Harding has made the statement that the Government would not permit the country to be hamstrung by a transportation tie-up at this time. This is interpreted in most circles to mean that vigorous action will be taken even to the extent of calling out troops to operate the roads and maintain order. The Government possesses the authority to do this under the Esch-Cummins bill.

The Coal Strike

THE United Mine Workers of America have made a proposal to the railroad brotherhoods to refrain from handling any coal from the mines. A sympathetic strike of this sort could do great damage were it not for the fact that comparatively little effort is necessary to transport the coal now being mined, whereas it would be of considerable importance were such an agreement to go into effect when both union and non-union mines were operating. The railroads will not be hard put to it to handle non-union production. The Administration, confronted with the cold, hard fact that our coal reserves are being so rapidly depleted that another month will see industry in serious difficulty, is said to be preparing to force the coal strike issue to a settlement. It is stated that the railroads have less than 7,000,000 tons on hand, according to some estimates, against which they are drawing at the rate of 145,000 tons daily. In seven weeks this reserve will be wiped out. At a conference between President Harding and Secretary of Labor Davis and John L. Lewis, president of the United Mine Workers of America, the differences between the operators and miners were thoroughly discussed, as well as the fundamental situation in the bituminous industry. It is understood that three points were stressed. First, over-development of the industry with its excessive number of mining operations; second, the excessive number of men employed; third, the intermittency and inadequacy of employment for miners. The union leaders insist upon the following course, according to informed circles: First, the President shall set a date for a joint conference of coal operators and miners' officials. This conference will sit until it terminates the present situation. Once the present strike is disposed of Congress would pass legislation creating a commission with full power to subpoena witnesses and records of both sides to the end of making an investigation, and getting down to the fundamentals of the problem. It is understood that the Administration favors the appointment of a commission of this character somewhat along the lines of the Interstate Commerce Commission.

Operators state that they will decline national treatment if possible, and insist on settlements by States, for one reason because not otherwise can they avoid the risk of prosecution under the anti-trust laws. They are considering, also, the opening up of mines in union territory with non-union labor,

in Perspective

in which case they will ask for protection by injunction under the Coronado decision.

The Textile Tie-up

THE textile strike in New England continues at a deadlock and production is being hampered to such an extent that prices may be materially affected this fall. With the coal industry, the railroads and the textile industries all hampered by strikes, it would seem that the time had come for union labor to "step on the soft pedal," according to editors of various trade and technical publications.

The Tariff and the Senate

THE Senate has been dawdling along with the tariff schedule and at the present rate no doubt it will be enacted before the next Presidential election. Business men all over the country are clamoring for immediate definite action on the bill and still Congress is playing politics. The Administration, faced with a party split on the tariff, is anxious for a scientific solution somewhat along the lines of the Freylinghuysen amendment, but nothing of this sort is possible at the current session. The majority of newspaper opinion is to the effect that there will be no tariff enacted at this session. On the other hand, keen observers in the Capitol insist that the bill will be passed if only to give the Democratic party a chance to use it as capital at the polls in November. There has been a great deal of dickering going on over the schedules, and many of them will be modified before the bill goes through.

Perhaps some indication of how dangerous the tariff bill is supposed to be as a party measure may best be gained by considering the effect on its two sponsors. Neither Senator McCumber nor Representative Fordney will be in Congress next session, the former having been defeated in the primaries in North Dakota and the latter having declined to run for re-election. There is no doubt but that the tariff bill is loaded with too many high schedules, and if it passes its effect on the party in power will not be wholesome.

Business Looking Up

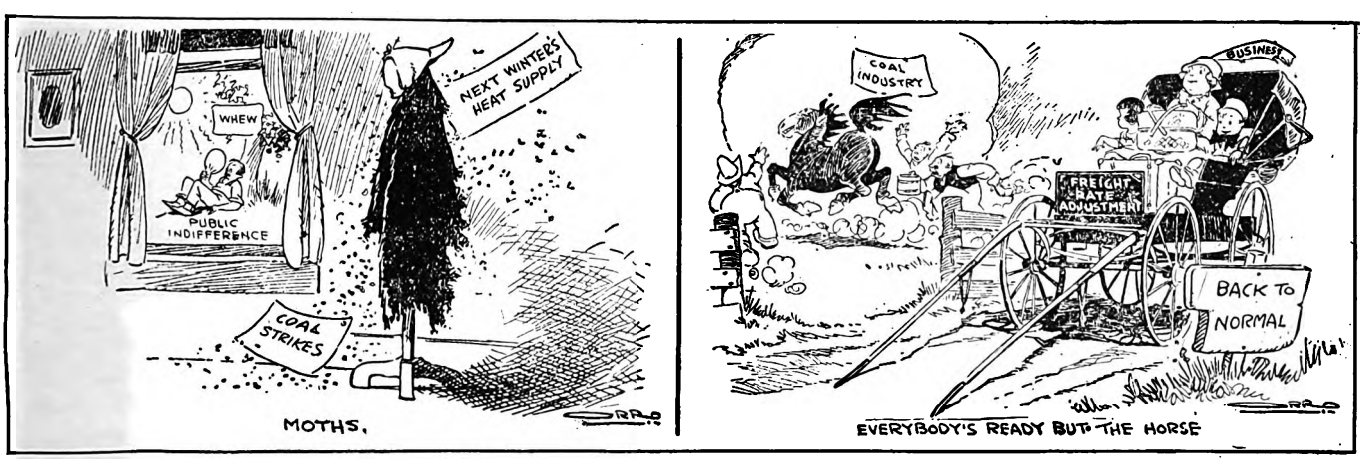
THE industrial situation has been improving steadily and at the present time indications are that though the summer will be quiet, the fall will be very active. Railroad car loadings have increased materially and the number of idle cars has decreased. A number of automobile companies have broken all previous records for production and sales. Within the last few months the steel industry has passed from a condition of relative inaction to one in which business is being placed for the third quarter of the year. As a result prices are turning upward and leading publications in the steel industry agree on the favorable condition of the industry and admit that the only factor which may tend to cause difficulty is the coal strike, and that even this is not likely to slow up production materially.

Secretary of Labor Davis has announced that unemployment has been steadily eliminated in the East and considerably reduced all over the country. The discount rates of the Federal Reserve Bank have been reduced, foreign exchange is displaying unusual strength, and in general financial conditions have been very favorable to industrial activity.

Coronado Decision Causing a Stir

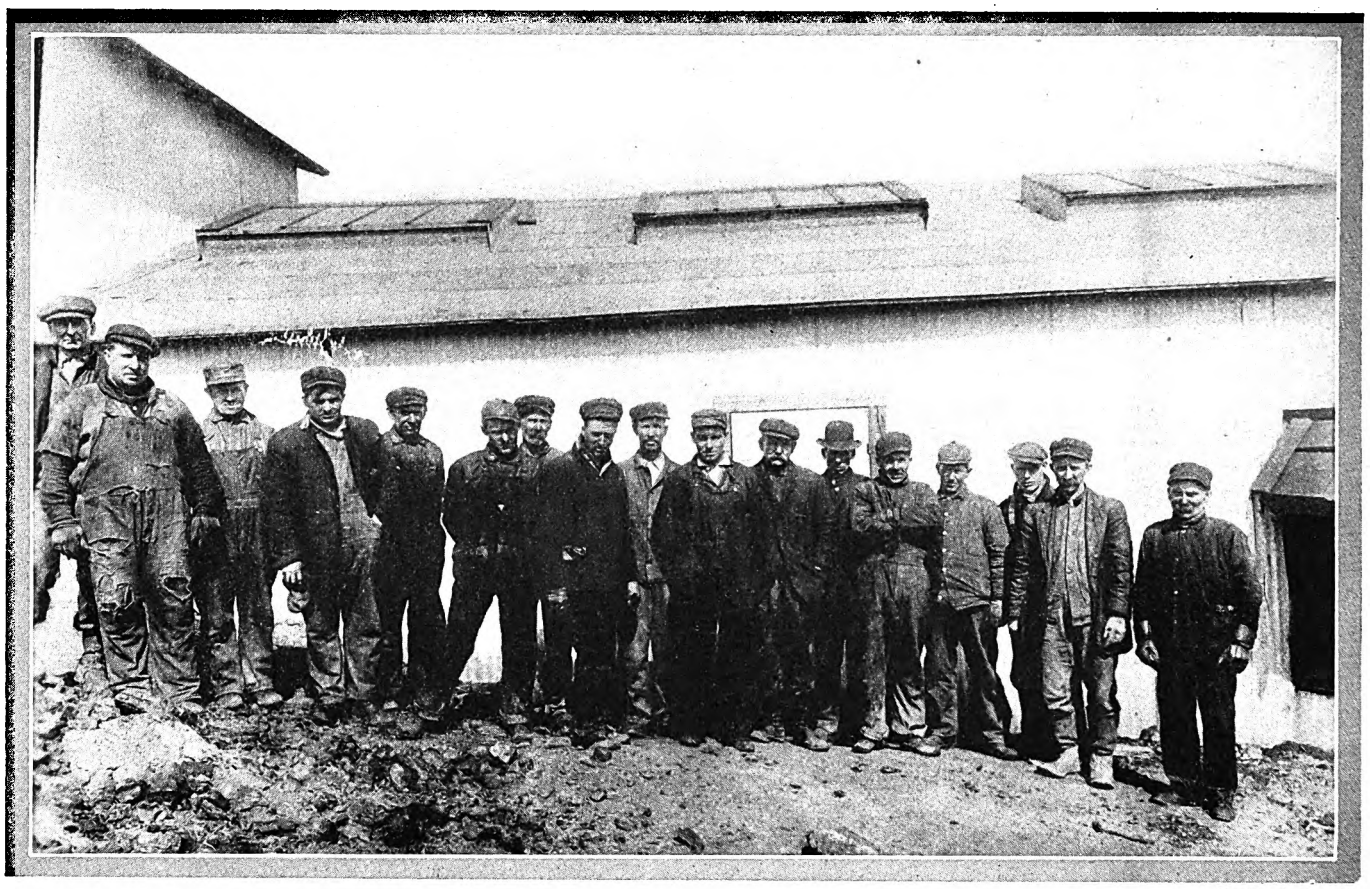
THE famous Coronado decision of the United States Supreme Court, to the effect that unions are suable, is apparently one of the most important decisions that have been made for a long time. Not only will additions to this decision be numerous, but such important disputes as the rail strike and the coal strike may be hastened to a settlement on account of this decision. In addition, labor leaders hold that since labor unions can be sued they can also sue, and counter actions are expected under the new ruling.

Now comes word that the organized farm movement which has been growing in the United States at an astonishing rate during the last few years feels that the Coronado decision is equally menacing to it. Members of the farm bloc who have studied the decision have admitted that they could see no reason why the court's decision is not applicable to the farmer's co-operative movement.



(Chicago Daily Tribune)

There Is, Indeed, a Relation Between Coal and Other Industries



(© Underwood)

Group of coal miners at Coal City, Ill., just before going on duty for their last shift prior to the strike in April. These are the type of men around whom centre the present difficulty at Herrin.

What's Wrong With Our Coal Mining Industry?

Why does most of our serious industrial trouble center around the mines—and what can be done to correct conditions so that the present disastrous strike may not be repeated next year?

WHY does murder go hand in hand with coal mining in this country? Why do riots repeatedly convulse our coal industry? Why, every once in a while, does an army of strikers march upon coal-mine property, shooting sheriffs, guards and strikebreakers, being fired upon in return? Why is there bloody warfare in the mining districts more often than in any other industrial center?

Surely there is something seriously wrong in an industry that runs amuck so often. Civil wars and massacres in West Virginia and southern Illinois could not take place if beneath-the-surface conditions were not fundamentally bad.

What is wrong with the coal industry? What can be done to correct the evils? No one can give positive answers to these questions, but it is time somebody tried to find them. The importance of coal to the entire industrial life of the country cannot be overestimated. Coal is the heart of American industry—and industry cannot afford heart trouble.

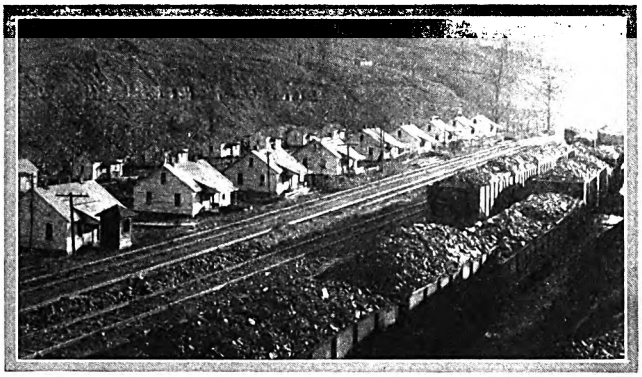
THE INDUSTRIAL DIGEST cannot answer the questions raised by the trouble in the coal industry, which was fastened upon public attention by the massacre at Herrin, Ill. It can only point out a few facts that seem pertinent, and present opinions of public organs and persons in touch with the situation.

The event at Herrin was one of the most sensational strike riots that has occurred in recent years. A party of strikers marched upon a strip mine operated by the Southern Illinois Coal Co., captured the mine superintendent and a party of workers, marched them off and massacred about 40 of them. For the next two or three days the bodies of victims who had been shot or beaten to death were picked up in roads and fields around Herrin, and fished out of ponds. Surviving strikebreakers told horrifying stories of cruelty.

Each party to the immediate controversy that led to the massacre blamed the trouble on the perversity of its opponent. Officials of the Southern Illinois Coal Co. blamed a telegram sent by John L. Lewis, president of the United Mine Workers of America, to the local strike leaders, saying that "representatives of our organization are justified in treating this crowd (the strikebreakers) as an outlaw organization." Union officials blamed the coal company, saying that it had violated an agreement when it tried to work the mine with non-union men, and that it surreptitiously armed the mine guards. Most newspapers attribute the massacre to sheer murderousness.

"It is for Americans outside of Williamson County and outside the sacred supra-legal circle of the union to ponder

this arch-deed of savagery," says the *New York Times*. "Is the law of the statute books or tumultuary violence, executing the will of the labor union, to prevail? At the moment when a strike to paralyze the communications of the country is blithely promoted, consideration of the rights of all as against the usurpations of a class, of law for all against the lawbreaking of a class, is especially needed. 'Ordered freedom under the law—' what a fine, sonorous phrase! In Williamson County and, from time to time, in many other parts of the country, it is nothing but a phrase, an irony, a cruel joke. It was fortunate that the United States didn't accept a mandate for Armenia. Our own massacres will keep us more than busy."



(© International)

Typical mining settlement in Harrison County, W. Va., where striking miners still reside in houses erected and owned by the operators. There are 550 mines in the region, employing 20,000 miners. None of the mines have been in operation since April.

The *St. Louis Globe-Democrat* echoes a universal sentiment when it says:

"No purpose of organized labor has been or can be advanced by such a grievous and misguided form of resistance as that employed at Herrin. The blood of blameless men, whose only offense was that they accepted employment of which they were in need to earn their bread, cries out against the cause in which they came to their death."

But the cry of "murder" is useless after the damage has been done, and as the *New York World* remarks:

"It is a waste of words to discuss the firing of the first shot or even the cause of the strike, as if settling the responsibility would bring the matter closer to a solution.

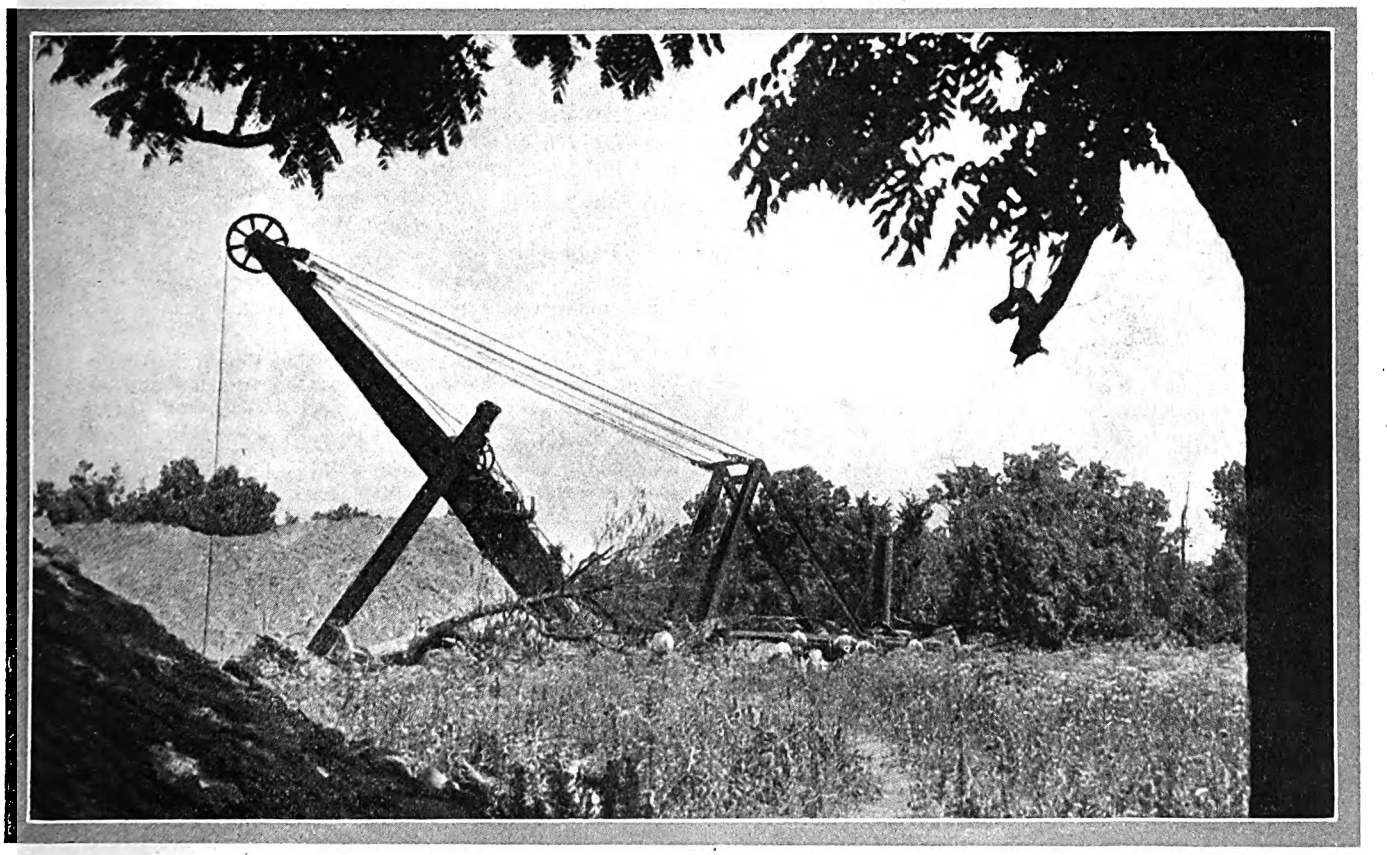
"As the shooting at Herrin was an incident in the strike, the strike itself is an incident in the history of inefficiency and unrest in the coal mines. Bituminous mining in the United States hardly deserves the name of a business. It is a chaos, and a bloody one. Because of seasonal production and uneven demand there are nearly twice as many men in mining villages as are needed. Because there are too many for the jobs on hand, and because they are isolated from communities that might furnish other employment, the miners cannot enforce their demands under normal conditions. With surplus labor keeping wages low, the pits will show a profit in a good year even when run without modern machinery or without regard for scientific engineering methods.

"They are so run, and according to the Federal Trade Commission they do show a fair profit. At the same time, a majority of the men are poorly paid upon an annual income basis and often desperate. When they strike they are met by the solid facts that there isn't enough money for higher wages, that there aren't enough orders to run more than 60% of the mines. They are met also by the autocracy of the mine-guard system, established to handle desperate employees.

"There is no final solution except a complete reorganization of bituminous production. Until that is done it will be necessary to restrain both sides from violence in a dreary series of conflicts ever menacing civil warfare. One after another, strikes will recur, bringing violence with them if continued, so long as coal is mined in this country as it is mined now."

* * *

One of the salient characteristics of the present method of bituminous mining is the unevenness of production. Mines open and close spasmodically. Irregularity, to the mine oper-



(© Underwood)

This picture shows the spot of the first mine riots at Herrin, Ill. Non-union workers were working around the shovel. The woods in the rear is where the men fled to escape the attackers.



(© International)

Picture taken at the mine during the disorders at Herrin, Ill., shows all that remains of the box cars in which the strikebreakers lived. While the men were in these cars the miners attacked, and strikers and their allies crept beneath the railroad cars in which the non-union mine workers had been living and fired. The engine in the foreground was riddled with bullets.

ators, means increased costs, lower profits, difficulty in obtaining and keeping an adequate force, mechanical troubles in the mine and waste of the resources. More important as an explanation of warlike conditions are its effects upon the workers.

"The potential working year in the American bituminous industry is 308 days," says F. G. Tryon and W. F. McKinney of the U. S. Geological Survey, writing in the *Survey Graphic*. "In the last 30 years the mines have actually worked on the average 215 days, and have lost 93 days, or 30% of the potential time in enforced idleness due to one cause or another. Even during the war, with an intense demand for coal and a working force depleted by the draft, the days lost numbered 65 in 1917, and 59 in 1918. In no other year before or since has the loss been less than 74 days, and in dull times it has frequently risen to 110 days. In 1919 the loss was 113 days; in 1920, at least 84 days; and in the disastrous year 1921 the industry as a whole probably lost 139 days, or more than after the financial panic of 1893.

"The burden of this loss falls heavily upon all who are concerned in mining coal or in transporting it, and, though unseen, it rests heavily upon those who use coal.

"The consequences to the miner are the most obvious. To him the short working year is a direct loss of income. It drives him to demand a daily rate of return that will compensate for the days when he cannot work."

The fundamental fact at the bottom of this is that America's bituminous mines are developed to an annual capacity of 750,000,000 tons, when the most that has ever been burned or exported in a year is estimated to be about 550,000,000 tons.

An additional cause of mine idleness is the constantly accruing car shortage that plays havoc with fuel transportation. It is estimated that the mines can load about 15,000,000 tons on cars a week. The maximum weekly capacity of the railroads is 12,000,000 tons—sufficient to handle the maximum yearly capacity of the mines if offered to them in equal weekly instalments, but not enough to take care of the maximum weekly mine output. When the demand for coal is active all mines seek to enter the market and all ask for cars to the limit of their rating. Hence the shortages of cars, which are due, not to a real lack of transportation facilities, but to irregularity of production.

"No doubt we need more cars, but simply increasing transportation facilities will not mend the broken year of the coal miner," says Tryon and McKinney. "The principal beneficiary will be the consumer of coal. Ample transportation is his best protection if he is to continue his present luxurious habit of buying coal whenever he wants it, without reference to the ease of supplying it. More cars, however, will not sell more coal. They will merely affect the distribution of working time through the year, tending to increase it in the periods of peak demand, and to make it still less than now in periods of low demand. Car shortages have occurred not infrequently, but it is a curious fact that rarely have they curtailed the actual consumption of coal. For the most part their effect has been to limit the quantity produced in the fall and winter, thereby forcing purchases to be made earlier in the year.



(© Underwood)

Living quarters erected by West Virginia strikers who have been "out" since April. The bitterness of the struggle is emphasized by scenes such as this.

"Transportation as the primary cause of the short working year in coal mines must therefore be dismissed. Its effect is secondary rather, and consists in controlling the distribution of work from season to season.

"Much the same is true of that part of mine idleness attributable to labor. Losses due to strikes are spectacular when they occur, and in the last 20 years have mounted up to the enormous total of 125,000,000 man-days. But the time lost on account of strikes is only 10% of the total time lost (or 3% of the year's working time), and it may be questioned whether much more coal would have been produced in the aggregate during that 20-year period if there had been no strikes. The strike of 1919 did force consumers to go without coal for a brief period, and was an underlying cause of the scarcity in 1920, but the complicating factors at that time were exceptional. More commonly strikes have been discounted in advance by accumulating large reserves of storage coal, and the task of meeting the country's requirements has been shifted to other mines or to other periods of the year not affected by the strike. In terms of man-days lost because of strikes, the year 1910 was the record. If seasonal demand is to be overcome, it can be only by storing an additional 21,000,000 tons in the dull season. To accommodate this tonnage above that ordinarily carried in stock presents difficulties, but they are not insurmountable, provided storage can be made financially attractive to the consumer. Various devices looking to that end have been proposed, among them seasonal freight rates and summer discounts in prices.

"There remains a measure of idleness which must be ascribed to sheer overdevelopment beyond even the maximum season's requirements. Allowing 44 days of idleness on account of seasonal demand, the loss due to overdevelopment may be placed at 34 days, but its share would increase if seasonal demand were eliminated. Smoothing out the demand into equal monthly instalments would not increase the total demand nor decrease the total capacity. It would change neither the number of days worked nor the number idle. Its effect would be merely to transfer 44 lost days from one ledger account to another. Eliminate seasonal demand and it would be necessary to debit sheer overdevelopment with a loss of 34 days plus 44 days, or a total of 78 days."

Much of the trouble in the coal mines is undoubtedly attributable to this overdevelopment, and the consequent interruption of operation. But other industries also work intermittently. There must be something more about coal mining which induces riotousness.

* * *

Perhaps the very nature of the work is partly responsible. Labor in a coal mine is not conducive to gentleness of spirit. Those of us who can toil above ground cannot realize just what digging coal out of a mine means to the worker.

Such a life makes men hard, stubborn, and willing to fight for what they think—rightly or wrongly—they must have. Coupled with these difficult working environments, hard living conditions are often found. This is especially true in West Virginia.

During the Mingo uprising last year much was published in the newspapers about the condition of civilization in West Virginia that is responsible for the repeated battles between miners and operators. The newspaper correspondents found that life in coal fields shed considerable light upon the violence of the struggle.

"If you will take a map of West Virginia, you will see that it is much like the map of any other State," wrote Winthrop D. Lane in the *New York Evening Post*. "Deep ridges of hills cut across its eastern and southwestern portions, but aside from these there is little to distinguish it from other maps. The same winding lines indicate rivers, the same dots show where its towns are, the same network of railways connects these dots.

"One can easily imagine the life that goes on in these towns as being the same that goes on in small towns everywhere. He can imagine people owning their own homes, pursuing a variety of occupations, attending to their own little affairs, and sharing in the town's common activities. He can imagine them acting like the independent citizens of other communities.

"But he will be mistaken. Nothing of the sort goes on there. In the coal-mining fields of West Virginia, comprising parts or all of 36 counties, the dots on the map do not stand for towns in the ordinary sense. They stand for clusters of houses around a coal mine.

"They do not indicate places where people lead an interrelated, many-sided and mutually dependent existence. They indicate points at which seams of coal have been opened, tipples erected, and coal has been brought forth as fuel.

"True, people live here, but they live here to work. The communities exist for the coal mines. They are the adjuncts and necessary conveniences of an industry. They are not independent groups of people. They are not even called towns in the language of the locality. They are called 'camps.'

"No one owns his own house. No one conducts a store, runs a garage, sells groceries or furniture to his fellow townsmen, or amuses them in a movie theatre. No one is free to decide today that he will change his occupation tomorrow, because there is no other occupation than coal mining; the only way he can change his occupation is to move to some other region.

(*Turn to page 1252*)



(New York Evening World)

No further trouble is expected.



(New York Evening World)

State powers asleep in Illinois.

What the Press Thinks of the Herrin Massacre

Is Your Coal Bin Empty Yet?

Have you anticipated the coming coal famine, or will your plant starve to death on account of lack of fuel?

AS the coal strike drags on, the nation's reserve supply of fuel is rapidly diminishing. At the present rate of consumption and production the danger point will be reached within a month, according to estimates compiled from reports of the United States Geological Survey and the Department of Commerce. If production is not increased by that time, it is said, the factories of the nation will have to shut down for a day or two each week to conserve the supply.

Manufacturers in New Jersey, according to reports of the employment service of the Department of Labor, have already begun to feel the pinch, and have been forced to curtail their activities to some extent.

Since April 1 the anthracite mines of the country have produced only a few thousand tons of coal. During that period they usually mine about 20,000,000 tons, nearly one quarter of the entire year's requirements. They are so far behind now that if work in the anthracite regions were to start tomorrow it would be impossible to turn out a full supply this year, even if the mines operated constantly at maximum speed, and had a continuous supply of all the freight cars they needed to take the fuel away.

In the bituminous industry the non-union mines are running at a terrific rate, producing between 5,000,000 and 6,000,000 tons a week. One Wednesday in the middle of June they broke a record by producing more than 17,000 carloads—the largest single day's production ever turned out in those fields. But in spite of the best they can do the nation's weekly consumption exceeds production by about 2,500,000 tons.

The situation in the bituminous industry, according to Government reports, has never been paralleled before. With the certainty of a shortage before them, the consumers of soft coal nevertheless delayed their purchases until the new freight rates went into effect on July 1. Up to that time coal accumulated at terminal points, clogging up transportation facilities.

In Alabama, at the close of June, there was so much non-union coal on hand that the bottom dropped out of the market. An order by the Interstate Commerce Commission permitting Alabama coal to travel into the Chicago market at a competitive freight rate with West Virginia coal brought thousands of tons north from Alabama, but left the Birmingham market still overloaded.

Now that the rates have been reduced a heavy demand is expected. New England, which has been holding off, will probably put its orders in, and the rest of the nation will do likewise. Then the shortage will begin to be apparent in the market.

Meanwhile the Federal Government lets it be known that it is taking measures to end the strike. The President's first efforts to effect a truce were unsuccessful, in spite of protracted conferences between John L. Lewis, president of the United Mine Workers, and members of the Cabinet.

Later, however, more optimistic reports came from Washington. It was announced that through the intervention of Mr. Lewis the anthracite leaders at Wilkes-Barre had abandone all plans to turn the present "suspension of work" into a real strike. The distinction is important, for under a "suspension" maintenance men are permitted to keep the mines in readiness for the resumption of work at any moment, whereas a strike means a complete shutdown and a possible deteriorations of the mine property. The willingness of the miners to make this concession was taken as an indication that the miner-operator conference called by the President had a fair chance for success.

Government Intervention

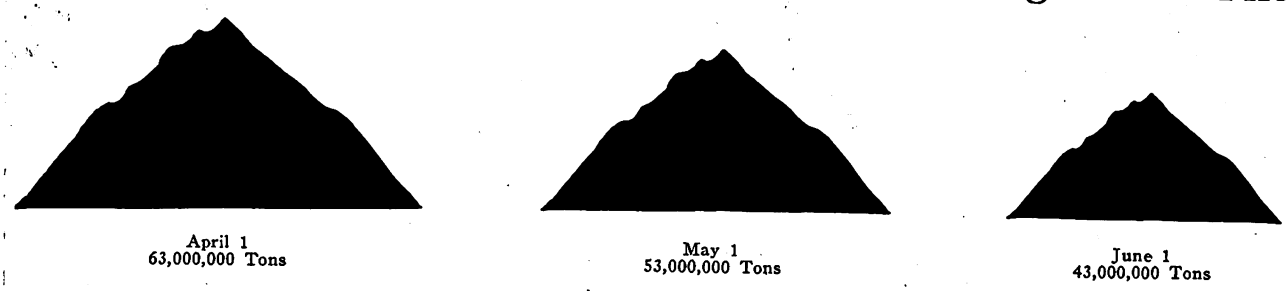
NO hint has been given as to which course Federal intervention will take if it actually becomes necessary. There appear, however, to be two alternative lines of action for the Administration. One possibility is the extension of protection to operators who wish to reopen their mines. It is regarded as extremely doubtful that President Harding would sanction this step, for it would amount to throwing the influence of the Government against the labor unionists. The Administration, of course, is extremely anxious to avoid taking sides.

The other alternative, which would not arouse the hostility of the miners, would be to establish Government control over enough mines to supply the absolutely essential needs of the country. The miners and operators could then be left to settle their dispute by themselves. The Government could distribute the coal produced in the mines it took over by an organization similar to that of the Fuel Administration of war days. Such a step would be extremely radical, and it is not believed President Harding would act until all other means had failed.

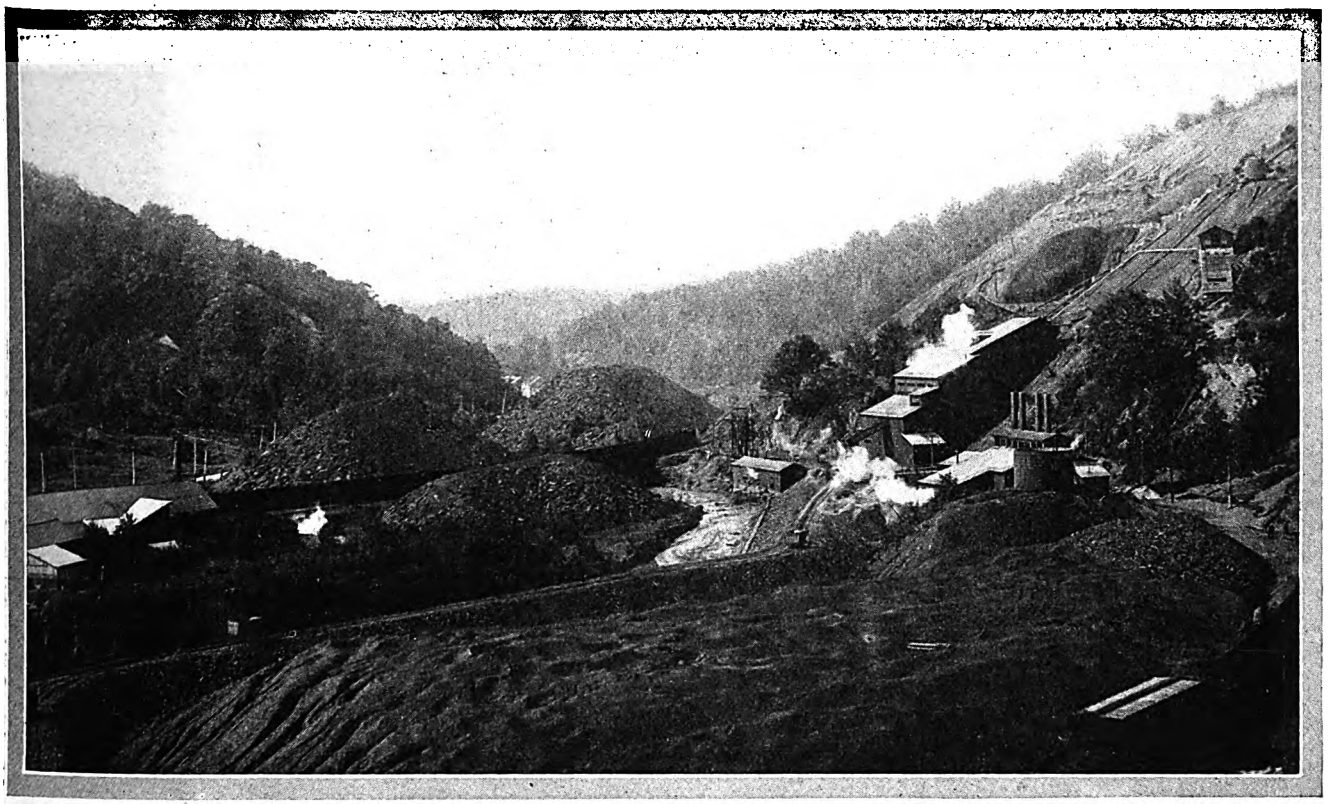
Such measures would merely be emergency steps, and would not solve the real problem, which can be settled only by the operators and the unions.

The strike is their controversy, in spite of the interest of the outsiders known as the public, and it can be settled only by an agreement between them. In order to be able to present to its readers a definite statement of the attitude of union

The Nation's Swiftly Diminishing Coal Pile



On April 1 the total coal reserves of the country were 63,000,000 tons. The normal rate of consumption is now 10,000,000 tons a month in excess of production from non-union mines. The minimum reserve for safety is 20,000,000 tons; a



(© International)

A modern washery at work. In the old mining days any coal smaller than our present egg coal was considered useless and thrown out on the dirt bank as unsalable refuse. These dirty banks grew to enormous size before any thought was given to the possibility of utilizing the coal they contained. The coal dirt is now washed by hydraulic power down chutes to the washery where screens separate the coal according to difference sizes.

labor to the dispute, THE INDUSTRIAL DIGEST asked a selected number of union leaders to answer the following questions:

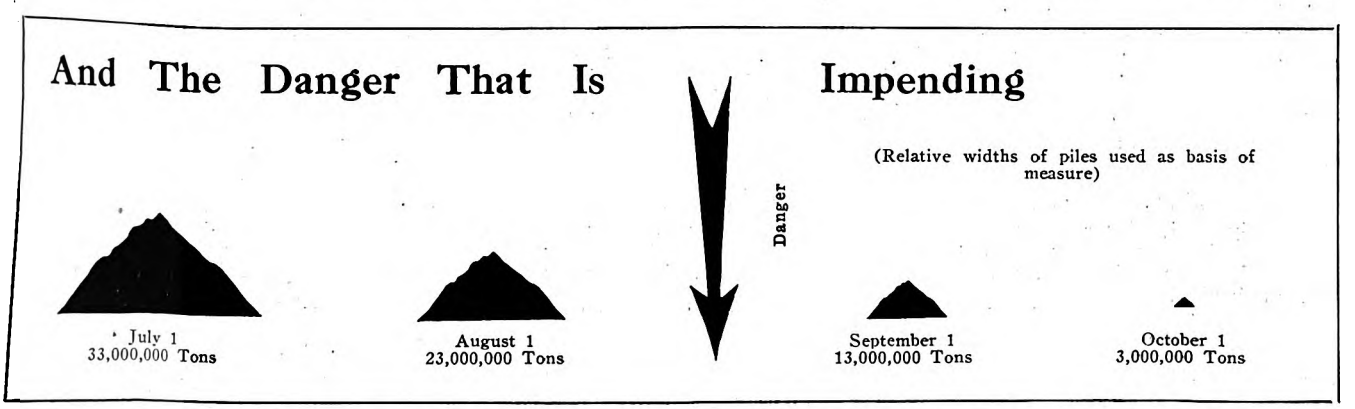
1. Do you think that the men were justified in resisting the wage reduction?
2. Do you think that miners should be paid on an hourly basis?
3. Are there too many mines in operation and should the less productive mines be closed?
4. What machinery do you think should be set up for the adjustment of wage disputes in the coal fields?
5. Do you think that government operation, ownership or supervision would be beneficial?
6. Do you think the strike will last long enough to create a real coal shortage?

Frank Farrington, president of District No. 12 of the United Mine Workers of America, in answering the questions as follows, showed that labor leaders are not in harmony as to the methods to be employed to win the strike.

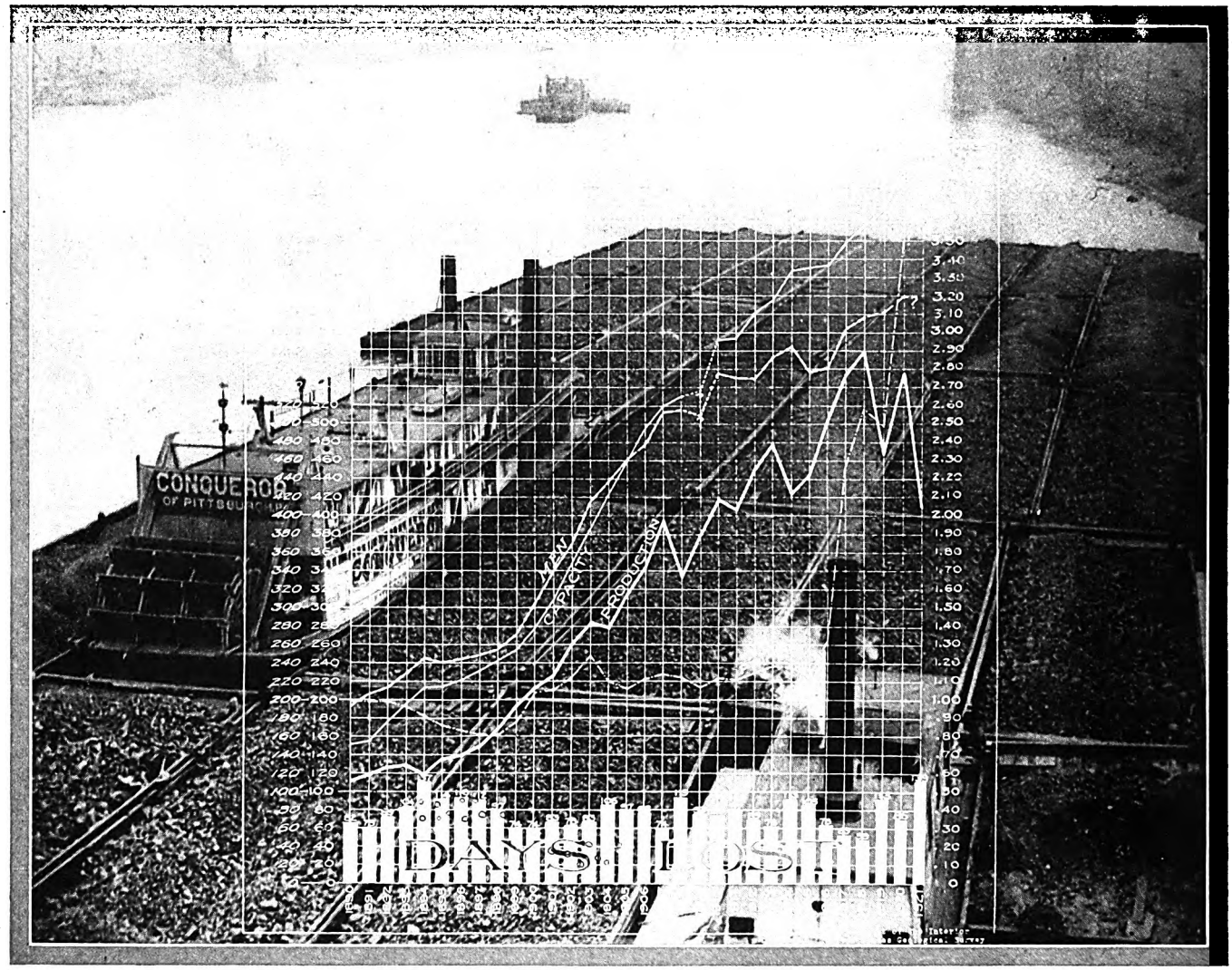
"Answering question No. 1, I advise that I certainly do feel that the miners are justified in resisting a wage reduction. Answering question No. 2, I advise that the miners are not now paid on an hourly basis, and I do not think they should be as I do not believe they would be able to secure an hourly rate that would enable them to earn as good wages as they can now earn working on a tonnage basis.

"Answering question No. 3, it is my opinion that the mining industry is at least 40% per cent overdeveloped. Answering question No. 4, I do not think any new machinery should be created for the adjustment of disputes. For more than a quarter of a century the mine workers and mine owners have been able to adjust their disputes by the means provided for in the various joint agreements, and I am satisfied that the present controversy could be adjusted in a satisfactory manner if Mr. Lewis would but abandon his stubborn position and allow us to make district agreements.

"Answering question No. 5, I advise that I am opposed to Governmental operation, ownership or supervision of mines so long as the administration of governmental affairs is in the hands of practical politicians who predicate their actions, not upon the merit of things, but instead base their judgment upon the effect their action will have on them politically.



condition that might result the second week in August if meanwhile steps are not taken to end the coal deadlock. If, after this turning point early in August, reserves continue to be depleted, industrial production will have to be curtailed.



During the last 30 years, the bituminous mines of the United States have lost, on the average, three working days out of ten. The chart above shows production, capacity, men employed, mine price per ton and days lost at the bituminous mines from 1890 to 1921—(*Survey Graphic*).

"Answering question No. 6, I advise that I cannot predict how long the strike will last, but my opinion is that if Mr. Lewis clings to his present position, which is that the operators from Indiana, Illinois, Ohio and Western Pennsylvania must meet him in an Interstate Wage Scale Conference, the strike will last until eternity."

Lee Hall, President of District No. 6, United Mine Workers of America, Columbus, Ohio, writes: In answer to the question (No. 1) Do you think the men were justified in resisting the wage reduction: "I answer the same by saying 'Yes,'—and do so for the following reasons: When the Bituminous Coal Commission made their report in 1920, which report was the basis for the settlement of the controversy then between the Mine Workers and Operators, they granted an increase in wages amounting to an average of (27%) twenty-seven per cent—while the Mine Workers had contended for a sixty per cent (60%) increase. In making this award of twenty-seven per cent, the Commission stated that in doing so, they expected there would be a reduction in the cost of living during the two-year period in which the contract was to be run, but to the contrary, we find an increase from the time the contract went into effect in 1920, until July, 1921. After that time there was some decline in the cost of living, though it was very small, and for that reason I contend the miners were justified in resisting a wage reduction.

"In answer to your question No. 2, I would answer 'No,' as the miners are not asking to be placed on an hourly basis; they prefer to work on the tonnage base.

"In answer to question No. 3—'Are there too many mines in operation and should the less productive mines be closed?'—you ask two questions in this one sentence; first, there are two many mines in operation, as the coal industry is at least forty per cent overdeveloped. In answer to the last, should the less productive mines be closed, I would not say that they should. To do so would probably work a hardship and injustice upon those who have their money invested in the mines that are now in operation. It would be just as fair to take the position to close down any other industry that may be overdeveloped, such as automobiles or any other kind of business, as it would be to close mines less productive.

"In answer to your question No. 4—'What machinery should be set up for the adjustment of wage disputes in coal fields?'—you do not explain what machinery you refer to; however, I would take for granted that you mean some Government machinery. I am opposed to any interference on the part of any Governmental agency in the adjustment of wage disputes in coal fields as they do not provide any machinery for the adjustments of disputes in any other industry, except railroads, and the Government machinery provided for the adjustment of disputes between the railroad workers and owners have failed in its purpose because the railroad companies have positively refused to comply with or be governed by the desires of the Railroad Labor Board, therefore I am opposed to any Governmental interference.

"In answer to your question No. 5—'Do I think that Governmental ownership would be beneficial?'—I am not as familiar with this question of Governmental ownership as I should be, and therefore decline to make any answer or comment on this section.

"Answer to your question No. 6—'Do you think the strike will last long enough to become a real coal shortage?'—I answer that question 'Yes,' and say that the time is here now, where there is a real coal shortage, and I predict that the coming winter will see the greatest coal shortage ever known in the history of this country, and with prices higher than even those that prevailed during and since the Great World war."

Consolidating Bucket Shop Losses

The gullible public has been fleeced of $15,000,000, since the beginning of the anti-bucket-shop campaign; 30 Consolidated Exchange member firms have failed since then

THE failure of the stock brokerage firm of E. M. Fuller & Co., New York, as a result of which it is estimated that 16,000 customers will lose $4,000,000, has aroused a flurry of resentment in the New York press against the Consolidated Stock Exchange, of which the Fuller firm was a member.

The Consolidated Stock Exchange is a secondary market, dealing in the stocks that are listed on the New York Stock Exchange. Prices on the Consolidated depend somewhat upon prices on the "big board," which is Wall Street's pet name for the New York Stock Exchange. When there was a fire in the big Exchange recently the Consolidated also closed down. Members of the Consolidated make things easier for the small speculator by trading in ten-share lots, whereas the official trading unit of the big Exchange is 100 shares.

Newspaper critics of the Exchange point out that 30 of the firms which failed since the campaign against bucket shops was started have been members of the Consolidated. They further assert that officials of the Exchange should have taken action against the Fuller firm before the disaster occurred.

"The story of the failure," says the *New York World*, "has no more amazing feature to most people than that the concern was permitted to remain as a member of the Consolidated Stock Exchange when, it seems, a cursory investigation by officials of the Exchange would have revealed the unsavory reputation of the firm's members, and also disclosed the fact that Fuller, aside from having a police record, had long been an associate of criminals.

"In the light of the recent record of the Consolidated Stock Exchange, however, the permission granted to the Fuller firm to continue in business as a member of that Exchange is not surprising.

"The Hughes committee, which investigated Wall Street, stated in its report that 'our investigation has indicated a lamentable indifference on the part of the management of the Consolidated Exchange to the prevalence of bogus transactions' and that the 'lack of the sense of responsibility calls for severest criticism.'

"Considering the recent record of failures of Consolidated firms and the malodorous nature of these failures, the quoted criticisms of that Exchange, made years ago, would seem to apply today with even greater force.

"Since the campaign against bucket shops was initiated last spring more than 30 Consolidated houses have failed. Debts of these firms to customers approximate $15,000,000. When final accounting is rendered by receivers they may be found to greatly exceed that sum. Recoverable assets of creditors are impossible to closely estimate. Taken collectively, these creditors may not obtain more than 10 cents on the dollar."

Even the New York Stock Exchange has not entirely escaped the resentment aroused by the epidemic of brokerage house failures. An attempt was made during the latest session of the New York State Legislature to enact a law for the licensing of stock brokers which would have sorely irked the big Exchange. The passage of this bill was prevented, but the feeling which caused its presentation still remains. The District Attorney of New York County has openly avowed that he will fight for the governmental control of all brokerage activity.

Leaders of the Stock Exchange decided that the way to arm themselves against these attacks was to clean house thoroughly. The leader in the house-cleaning movement is Seymour L. Cromwell, president of the New York Stock Exchange, who periodically issues terrifying pronouncements to member houses that the Committee on Business Conduct will get them if they don't watch out. Mr. Cromwell argues publicly that the Stock Exchange itself is the best possible licensing agency for the protection of the public, and apparently he intends to make his words good.

The New York Stock Exchange is now circulating a questionnaire among its members inquiring, in a large list of items, about their business condition. Mr. Cromwell expects that the data which will be presented in response to this questionnaire will disclose any sore spots that call for action by the board of governors.

Stock Exchange Head Explains

SAMUEL UNTERMYER, in the course of his inquiry into the merger of the Midvale, Republic and Inland steel companies, condemned the practice of dealing in securities "when, as and if issued," a practice which is indulged upon the New York Stock Exchange as well as on the smaller exchanges. Mr. Cromwell, replying to this criticism and explaining the useful functions of the Stock Exchange, said:

"The Exchange is now a market for upward of 700 separate stocks and over 1100 different issues of bonds, the total value at par of these securities amounting to some $60,000,000,000. A market of this character performs a great public service in that it keeps a vast proportion of the national wealth in liquid form. How efficiently the Stock Exchange performs the functions above referred to may be gathered from the fact that almost any day securities of upward of $100,000,000 par value are bought and sold on the New York Stock Exchange, and seldom are there any disputes over transactions.

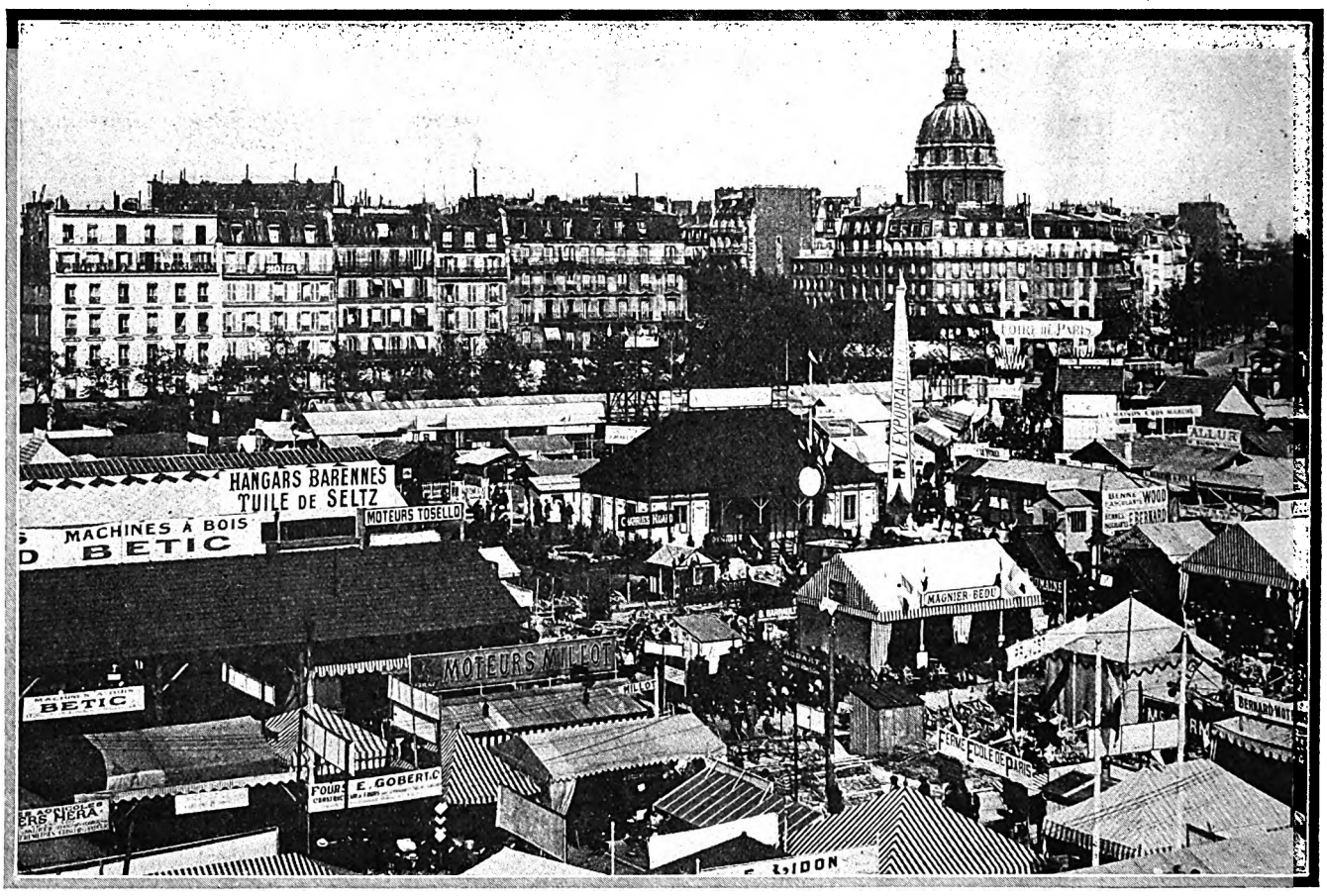
"We have heard a great deal concerning the question as to whether or not securities may be properly dealt in on the floor of a securities exchange before the same securities are actually issued in definitive

(*Turn to page 1252*)



(*Omaha Daily Bee*)

Just when business is beginning to sit up



The Foire de Paris, France's Great Annual Sales Fair

This picture shows but a corner of the exposition grounds on the Champ de Mars, Paris, giving an idea of the type of buildings used to house the wide range of exhibits. There were 4500 exhibitors this year, all French manufacturers, and some 2,000,000 visitors, a large number from foreign countries.

The Village Store Idea in Industry

How Europe's method of annual fairs differs from the American plan of specialized expositions

INDUSTRY in Europe habitually makes use of a sales method that is virtually unknown in the United States—the industrial fair. Once or twice each year the manufacturers of an entire region bring their wares to a commercial center such as Leipzig or Lyons or Dresden, where buyers congregate. All kinds of goods are exhibited, from phonographs to fabricated houses, and the volume of sales is great.

In this country we have expositions, but they do not resemble these European events. Our great fairs, at which all kinds of goods are shown, are held only on rare occasions, commemorative of important historical occurrences. They are spectacles, not ordinary periodical merchandising devices. The coming Philadelphia sesquicentennial exposition will be no more comparable to the Leipzig spring fair than John Wanamaker's Philadelphia establishment is comparable to the general store at Horicon, N. Y.

In particular industries we have adopted the idea of periodical expositions. We have our annual automobile show, our chemical exposition, our silk exposition. These differ from the European fairs not only in the fact that they concentrate on one product alone, but also in that they are shows rather than sales events. People attend them to look rather than to buy, and sales are made through other channels.

Known officially as the "14th Foire de Paris," the annual exposition of French industrial products just held at Paris has been a greater success this year than ever before, either in pre-war years or since the armistice. The number of French manufacturers exhibiting showed a large increase over last year, and the crowds thronging the grounds every day of the fair broke all previous attendance records and kept the gendarmes busy handling traffic.

The fair opened May 10 and ran until May 25, and while the committee has not yet given out any figures to indicate the volume of business done by exhibitors, it is safe to say that the amount of buying done, when made known, will reveal a healthy business state of mind and pocket-book.

The Foire de Paris has grown from year to year until now it is in fact a national exposition, and although French-made goods only are permitted to be shown, the number of industrial and business men from foreign countries who came this year and bought machinery and equipment, made in France, should cause foreign trade experts to look up and take notice.

There were 4500 exhibitors this year, compared to the 3800 in 1921, and it is estimated that the attendance totaled more than 2,000,000 people.

Agricultural implements, electrical machinery and electrical appliances, gas engines for industrial and farm use, modern office equipment and models of small dwelling-houses of the

type being erected in the devastated regions were among the exhibits attracting the greatest amount of interest.

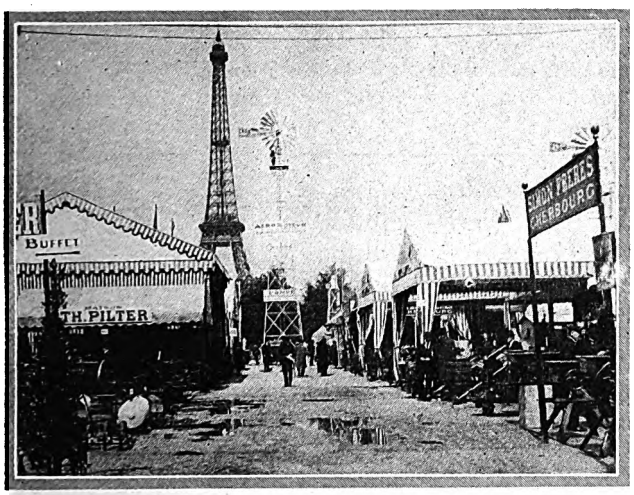
Features of France's Annual Fair

THE majority of agricultural implements shown were of the horse-drawn type, although a few motor-driven machines were present. France is not a country of big farms, and the horse has not yet been displaced in the rural sections. Gas engines are widely used on the farm generally, for pumping, threshing, etc., and the exhibits of farm lighting sets (including several driven by windmills) attracted much attention. Mention must also be made of the comprehensive line of moderate-priced farm bathroom equipment, made possible, more or less, since the development of the small motor-driven farm pump. These sets are sold with either gas or oil water heaters, galvanized tub and necessary piping, the prices, installed, ranging upward from about $75 American money.

France is wide-awake to the saving to be effected by the use of labor-saving and time-saving machinery if and when it means a saving in high-priced labor, but where common labor, only, is involved industrial plants and farmers both sometimes show a tendency to stick to old-time methods if the change to the new means too great an initial expenditure.

A rather striking illustration of this characteristic feature of the way Frenchmen work, both on the farm and in industrial plants, was afforded by the exhibition of two-wheeled horse-drawn carts (wheels nearly six feet in diameter) alongside the really splendid showing of the most modern types of self-loading and dumping industrial motor trucks. These lumbering carts, capable of carrying tremendous loads, are still extensively used in France. For hauling heavy machinery and freight on farms and in cities where time is not an important factor in transportation, they are more economical than motor-driven vehicles. At least that is what one Frenchman said when asked to explain their presence at an exhibition of modern machinery and methods. When one remembers that motor fuel in France is almost three times as expensive as in the United States, there seems to be something to the argument.

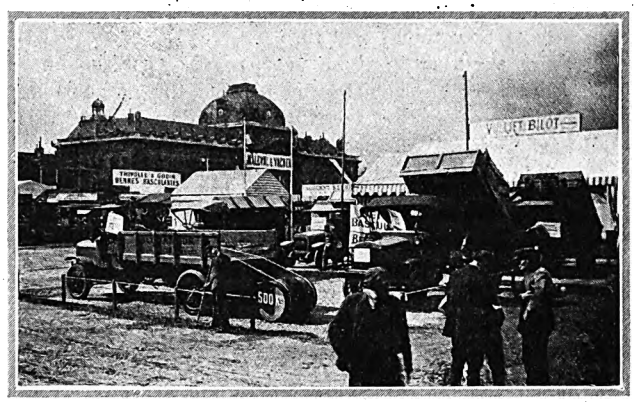
The display of electrical machinery, comprehensive in other respects, fell below expectations as regards exhibits of radio telephone sets. Only a few firms had such apparatus on display—certainly not over half a dozen—and there seemed to be no actual demonstrations being made. The concerts now being broadcasted from Eiffel tower wireless station would have stimulated interest, but apparently none of the firms exhibiting radio telephone sets were giving actual demonstrations. France is where the United States was about a year ago on radio telephony. The interest here is hardly more than an echo of the tremendous fad in the States. Six months from now, however, it may be a different story.



One of the principal aisles of the agricultural machinery exhibition section of the 14th Foire de Paris.

The exhibits of essential machinery and moderate-priced dwelling-houses were of more than passing interest. More than a dozen firms in France manufacture houses and are selling them in great numbers in northern France. One firm, which specializes in a four-room concrete farm dwelling, have built 275 such houses in the Department du Nord and 25 in Meurthe et Moselle. Prices for such houses range from 3000 francs for a two-room wooden house up to 18,000 and 20,000 francs for concrete houses of four and five rooms. Easy terms of payment are arranged for the buyers.

Modern office furniture and equipment, prominently displayed, gave evidence of the awakened interest of French business men in making their offices efficient and comfortable. Desks and filing cabinets of the more expensive grades were shown in considerable number. In this same building it was interesting to note that more than a score of French advertising bureaus had stands, and gave out information and literature explaining the features of the services they offer French business houses.



The industrial haulage section of the Foire de Paris, showing types of motor-driven vehicles on display.

Advertising in France

WHILE advertising is generally taking root more firmly year after year in the French commercial structure, it is still regarded by the general run of people as a sort of luxury, to be indulged in by a firm only after it has reached a certain stage of importance or success. Novelty window displays, striking lighting effects, and small automatic electric flash signs, however, seem to be looked upon as more legitimate means of publicity than the printed word in newspapers and periodicals. Accordingly advertising concerns offering for sale these various appliances for "mechanical" advertising had crowds around their stands, whereas the concerns offering the prospect a service of art work and printed words found time hanging heavily on their hands.

One "attention-getter" of very pronounced effectiveness was the electric siren mounted on top of the booth of a manufacturer of compressed air and electric alarm devices. This siren was the same type as was used throughout Paris during the war to warn the Parisians of approaching air raids, and its weird cry sounding through the fair grounds brought the progressive manufacturer's agent more spectators than he could accommodate.

The methods employed at the Foire de Paris have been in vogue in Europe for many years, particularly before the war. As the countries recover from the effects of the war, the fairs are becoming more numerous as a means of meeting the trade competition from foreign countries. This year's French fair proved its value particularly as a means of keeping trade at home.

When Economic Doctors Disagree

Expert diagnosis of industrial ills often results in confusion to the business man, but certain fundamentals may always be counted upon to run true to form

PROPHETS are much in demand nowadays. The course of business has been disturbed, and people are anxious for guidance on the probable trend of prices and business conditions in general. In response to this demand great numbers of diagnosticians of economic conditions have arisen, and many persons, more or less trained in economics, are offering forecasts of how things will turn out.

Is there anything in these prophesies? Can the business man learn anything valuable by reading the outpourings of these prophets, or by following for himself the various statistical "indices" of business?

Certainly no one should place too much reliance on detailed, specific prophesies of economic events. The prophets disagree among themselves too much, and they have often been found wrong. Yet there is an increasing tendency among business men, bankers and really competent economists to assume that something actually can be learned, by the cautious study of statistics, about the general tendency of business movements.

Economic science is, however, in so unscientific a state that everyone must determine for himself whether or not the statistics with which he is dealing are reasonably reliable. The interpretation of those statistics is also a matter in which personal judgment must be used.

Charts showing the variations over a period of years in certain series of statistics are a favorite device of the economic prophets. The graphs in the accompanying illustration, which were prepared by Leonard P. Ayres, vice-president of the Cleveland Trust Co., are excellent examples of this sort of thing. They present records of the fluctuation in pig-iron production, stock prices, bond prices and interest rates during six great business depressions that have taken place in this country since the Civil War.

In each case, the charts show that the recovery has been marked by increasing industrial production, rising prices for stocks and bonds and low interest rates. The black silhouette background shows the course of pig-iron production for the four-year periods. The line at 100 represents the average monthly output during the periods, and the black silhouette shows for each month the degree to which the output was greater than the average, or below it.

The three lines running across the diagram represent the average market price each month of ten high-grade railroad bonds, the average price of ten high-grade railroad common stocks, and the average quotations for choice 60 to 90 commercial paper in New York. This last line, showing the course of interest rates, has been drawn after multiplying the quoted rates by ten, so that 60 on the diagram means 6%.

Three significant features may be noted. The first is that in past depressions the high point for bonds was reached about 14 months after the low point for pig-iron production. The second is that the high for stocks came approximately two years after the low point of pig-iron production, and the third is that low interest rates continued for about one year and a half after the lowest point for pig iron.

Pig-iron production has been used in these diagrams to represent the course of industrial activity. Its figures are almost the only statistical series of industry running back by months in adequately reliable records over the past 40 years. Moreover, these data constitute a sensitive and trustworthy barometer of industrial activity, for almost every sort of manufacturing operation is dependent on iron for material, machinery or construction. It may be accepted as a generally valid proposition, according to Mr. Ayres, that when pig-iron production falls off, general manufacturing activity is declining, and when it increases it is because it is expanding.

The Object of Charting

THE object of compiling and charting such information is, of course, to enable one to judge the future from the past. Such judgment is difficult because the past does not repeat itself accurately. Conditions are different in every epoch, and it is difficult to allow for the variations.

This point is made by the Harvard Economic Service,

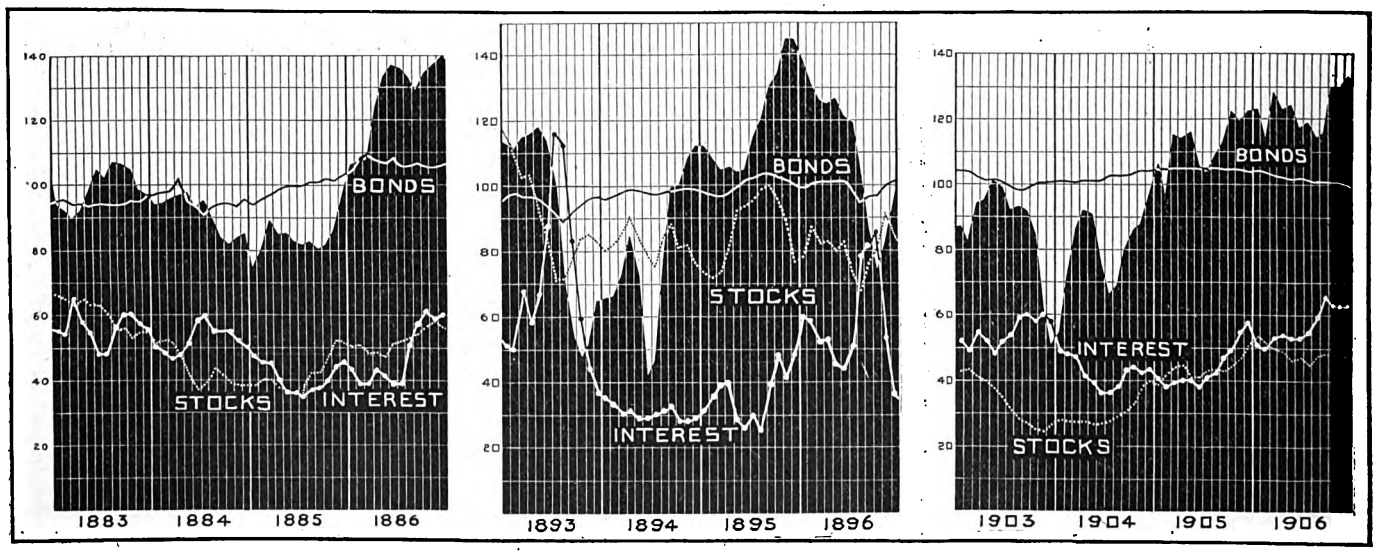


Diagram 1—The long and slow depression from 1883 to 1886. *Diagram 2*—The severe and irregular depression beginning in 1893, with crop failures in that and the following year, and partial recovery in 1895, followed by further depression in 1896. *Diagram 3*—The short depression of 1903 and 1904, sometimes called the rich man's panic. *Diagram 4*—The depression of

another economic prophet, which thinks that this time the past will not be fully repeated. This organization points out that after each of the two important periods of inflation which took place in the 19th century, prices dropped at least as low as the levels preceding the inflation, but it does not believe that the same thing will happen now.

"The high prices prevailing during the first half of the second decade of the 19th century, which were due to inflation caused by war, were followed by a long period of declining prices which continued, with temporary interruptions, until 1849, when the gold discoveries in Australia and California enormously increased the production of the yellow metal and inaugurated a period of rising prices," says the Harvard Economic Service.

"In the United States this upward swing was succeeded by currency inflation during the Civil War; and this, in turn, was followed by a period of drastic deflation which, by 1878, had brought prices back to a level lower than that prevailing in 1861. During the '60's gold prices in England pursued the even tenor of their way, but in the early '70's they entered upon a long decline which lasted until 1897. In the United States, which had returned to a specie basis in 1879, a similar movement was recorded; and like developments occurred in all other countries which had a gold standard. The upward swing of commodity prices from 1897 to 1914 was due to another phenomenal increase of gold production, resulting from the opening of the South African mines and the introduction of new and improved methods in quartz and placer mining.

"The inflated prices of the last eight years require no comment except that the great increase in the United States was due to the expansion of bank credit, not to inconvertible paper money, and to prodigious imports of the yellow metal which enabled credit to expand without causing a departure from the gold basis. From this historical record the natural and plausible inference has been drawn that just as prices after the two previous periods of currency inflation reverted to their former levels, so in the present instance they must return to something like the level that obtained in 1913.

"But historical parallels are likely to mislead unless care is taken to determine whether all important conditions are the same. From 1815 to 1848, and from the late '60's to 1896 they seem to have been so; but some of the leading factors in the present situation are very different from those operative in the previous instances, so that judgment should be suspended until these points are carefully examined."

The Service then goes on to compare the present with previous situations. After former wartime periods of inflation, it says, the United States was able to extinguish its national debt quickly and without great hardship by means of customs duties, excise taxes and public land sales. Therefore a drastic return to pre-war prices was possible. If the national debt had remained unreduced, falling commodity prices would have magnified the debt and thus proved a great hardship. At present, the Service says, the national debts of the world cannot be extinguished quickly, and a drastic drop in commodity prices would be so irksome as to cause political disturbances.

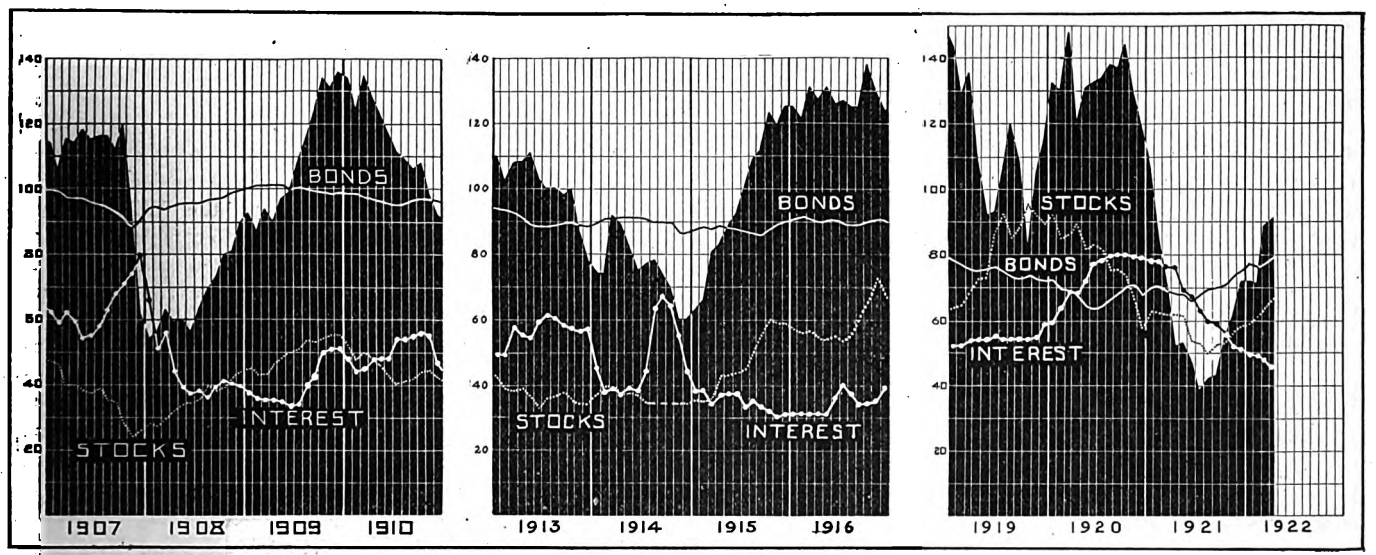
Moreover, it is pointed out, the present differs from the past in that a world-wide return to the pre-war gold parity of currencies seems impossible today. Complete deflation of the currency of the world cannot be effected. Present high prices, of course, are due largely to continued world inflation; and if world currencies cannot be deflated, prices cannot drop.

The most interesting difference between the past and the present which the Service has discovered has to do with the gold supply. According to the quantity theory of prices, commodity prices vary directly with the size of the gold supply. The annual increment to the world's stock of the yellow metal, it is pointed out, has decreased considerably since the war, but is still considerably larger than the annual increment which the world received during previous periods comparable to the present.

"The evidence shows that the annual increment to the world's monetary supply has fallen from a pre-war level of $232,000,000 to $150,000,000," says the Service. "This is a substantial decrease, but it does not justify alarm concerning the future course of gold prices. Before the war commodity prices were increasing at a very substantial rate, with an annual gold increment of $232,000,000; and there was general complaint of the increasing cost of living, which had led to the appointment of numerous parliamentary and legislative commissions to investigate the problem. In view of this fact it would seem that an annual increment of $150,000,000 should be ample to prevent a decline of prices during the present decade."

This is quite a different conclusion from that of Mr. Ayres, who says: "It is probable that we are entering upon an extended period of falling prices, broken by occasional shorter periods of rising prices."

Thus the experts disagree. Should one conclude, therefore, that the judgment of the experts is worthless, and that attempts to diagnose business conditions are useless? A preferable conclusion is a less drastic one: that economic diagnosticians, like their brothers in medicine, are wise but fallible, and that one should take advantage of their wisdom conservatively, and use one's own judgment in accepting or rejecting their pronouncements.



1907 and 1908, accompanied by acute industrial disturbances, and by financial difficulties so serious as to provide the final illustrations and arguments necessary to bring the Federal Reserve system into existence. *Diagram 5*—Depression preceding great war, with its quick recovery to war-time prosperity. *Diagram 6*—The depression following the war with Germany.

Your $100,000,000 Investment

You are a part owner of one of the finest power plant projects in the world, lying idle at Muscle Shoals because your Uncle Samuel has not decided how to dispose of it

ACROSS the Tennessee River near Florence, Ala., stretches a strip of concrete and scaffolding—an unfinished dam. About it is gathered everything that goes to make up a great manufacturing center; two large nitrate factories, a steam-electric power plant, quarries, water works, lighting plants, homes for employes, schools, and assembly halls. All are idle and in various conditions of completion and repair. In addition, also idle, is a complete set of equipment for dam building; a three-mile railway line to haul materials, 45 locomotives laid away in grease paint on a siding, a fleet of barges and dredges to bring sand and gravel from the lower river channel, and the largest concrete mixer in the world.

The section of the Tennessee River in and beside which this idle equipment lies is known as Muscle Shoals, and this name has been given to the entire unfinished project. The Congress and press of the United States are now engaged in discussing what is to be done with it.

The cost of the project to taxpayers to date has been estimated by various authorities at sums ranging from $106,000,000 to $167,000,000. Congress has expressed an ardent desire to prevent this money from going to waste, but has been unable to agree on the method of continuing the work so that results can be shown for the expenditure. Henry Ford has offered to take the plant over and run it, and Congress is now debating his offer.

Muscle Shoals is one of the largest industrial projects ever attempted. Its hydro-electric plants are expected to develop 1,000,000 horsepower. The people of the South believe that the completion of this great power unit would give a new impulse to their industrial life, and would make the Tennessee valley a new national industrial center. Muscle Shoals, they say, is situated in the midst of raw-material supplies—including calcium limestone deposits, coal and coke works—that would make possible factory development in the neighborhood to an extent previously unheard of. Farmers throughout the nation have been led to expect that the development of Muscle Shoals will mean an abundance of cheap fertilizer for them. The extent and seriousness of the agitation over Muscle Shoals is to be explained by the fact that these visions hinge upon the development, as well as to a desire to prevent the waste of more than $100,000,000.

* * *

Ever since the United States has been a nation this section of the Tennessee River has been considered an unusually favorable site for a dam system. The river drops 133 feet in seven miles at Muscle Shoals, over a shifting bed, and the possibility of a successful dam, with locks, both to make the river navigable and to develop water power, has always been apparent. Since the beginning of the 19th century plans for the development of the Shoals have been considered by the Federal Government, which repeatedly investigated and then dropped them for one reason or another. Work was started on a dam in 1820. In the next 70 years several attempts were made to put a development through, and in 1890 a canal, paid for jointly by the United States and the State of Alabama, was opened to navigation. This canal is 16 miles long and contains 11 locks—and is not much used. In 1910 a commission of engineers recommended to Congress that a dam be built at Muscle Shoals for power and as an aid to navigation. Four years later drill tests were made and the dam pronounced feasible.

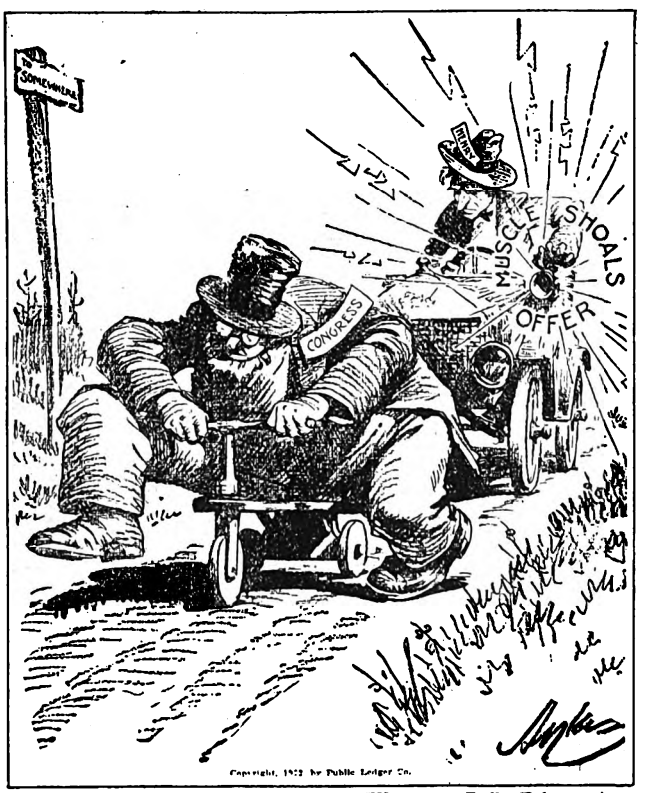
The Start of the Muscle Shoals Project

WHEN the United States entered the war one of the nation's first needs was a great quantity of nitrates for explosives. Speed was essential; cost did not matter. It was decided that the quickest way to get the nitrates was by the construction of a plant for the fixation of the nitrogen of the air, a process which requires great power facilities. Muscle Shoals presented itself as the ideal place for such a plant, and accordingly the war Government started the project which the present Government finds itself called upon to finish.

The plans called for the construction of two dams to harness the Tennessee, and two plants to make nitrates, one by the synthetic ammonia process similar to that used in Germany and the other by the cyanamid process used at Niagara Falls. Work on the dams proceeded slowly, but the nitrate plants were constructed with comparative speed. A steam-electric plant was built, supplying power to nitrate plant No. 2, which made several thousand tons of ammonium nitrate before the armistice was declared.

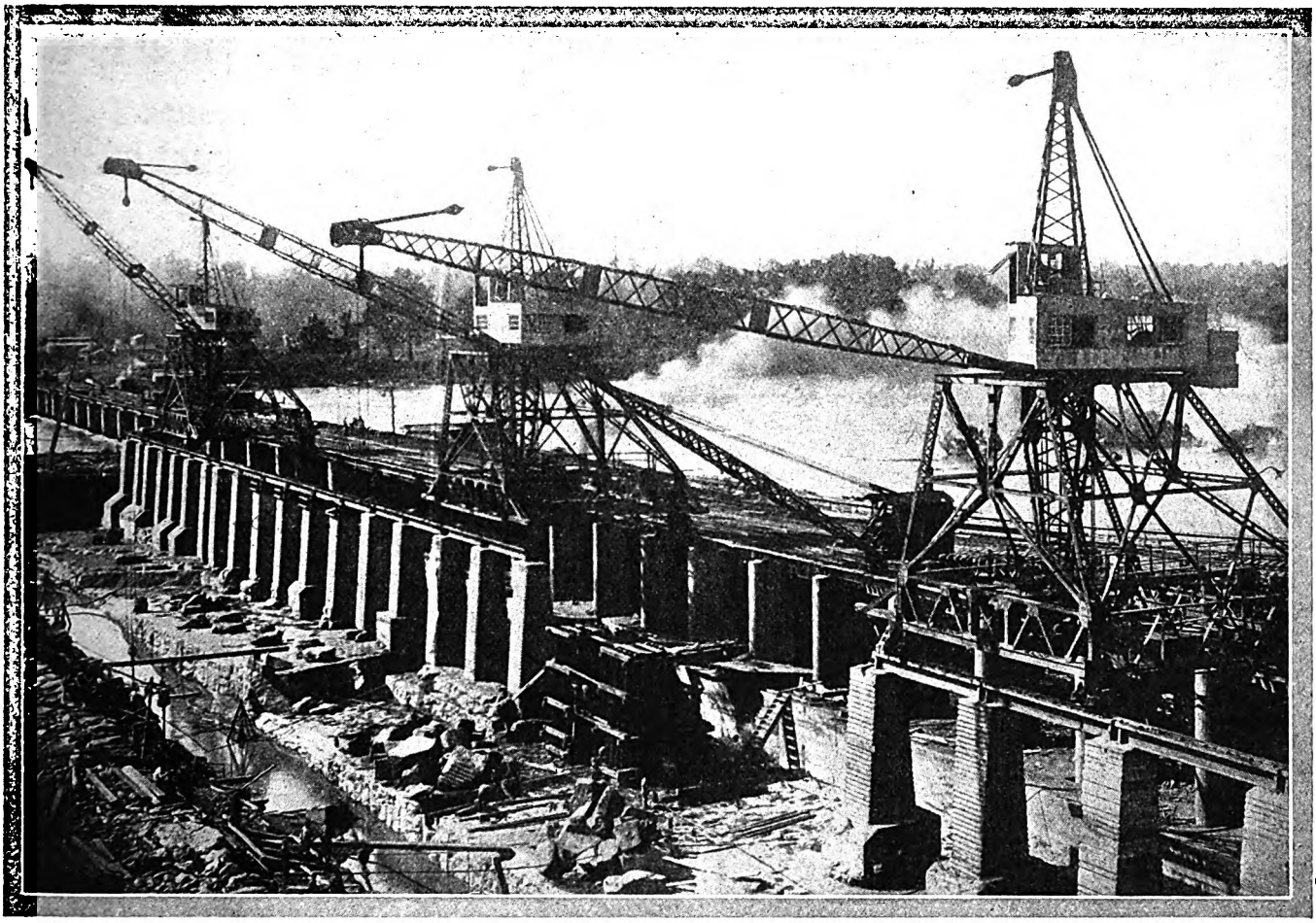
On armistice day the larger of the two projected dams, known as the Wilson Dam, was about 5% completed. Work was continued until May 1, 1921, when the funds on hand were exhausted. At this time the dam was about 35% finished, and materials representing a larger percentage of the expected total cost of the dam had been gathered on the site. The project rests in this condition today.

The Wilson Dam, when completed, will be 160 feet wide at the base, with a 59-foot apron



(Worcester Daily Telegram)

The "honk" heard throughout the country, but not by the gentleman in front.



(©) *Brown Bros.*

The big Wilson Dam nearing completion at Florence, Ala., the Muscle Shoals district which Henry Ford wants the Government to lease to him.

to prevent abrasion. The driveway on top will be 133 feet from the river-bed, and the entire dam will be 4600 feet long. A 95-foot power head will be used to operate generators with a capacity of 600,000 horsepower, more than that generated by all the hydro-electric plants now operated in Alabama, Georgia, South Carolina, North Carolina and Tennessee. The other dam, 17 miles farther up the river, will be 50 feet high, and will develop 250,000 horsepower on a 42-foot power head. Two locks will be needed to permit vessels to pass the Wilson Dam, and one will be needed at the other barrier.

Those who dream of making the Tennessee valley the great industrial center of the nation say that eventually a dam should be erected for every five-foot drop in the river. Oil-burning, self-propelled barges should be operated past these dams through a series of canals, to carry supplies for the farms and factories that will spring up side by side along the river.

What a Power Company Would Do

OF the offers for the purchase and operation of property at Muscle Shoals received by the Government, those of the Alabama Power Co. and of Henry Ford are the most important. The power company offers:

(1) To complete the Wilson Dam at its own expense, under a license to be granted to it under the Federal Water Power Act.

(2) To furnish free to the Government, or anyone it may designate, the second 100,000 horsepower developed by the Wilson Dam, for use in producing fertilizers and munitions. If the use of this power is discontinued by the Government, the Alabama Power Co. offers to purchase and pay for it according to a schedule to be set forth in the license.

(3) To buy the Government's interests in the steam plants at Muscle Shoals for $5,000,000, less an amount agreed on to cover the cost of locks and navigation structures at the Wilson Dam.

(4) To operate and maintain the power plant, dam and gates, and to supply free of charge the power required by the Government to operate the locks.

(5) The project covered by the license is to expire in 50 years, and the Government is to have the right, in time of emergency, to take over the plant to manufacture war materials.

Henry Ford's Proposal

HENRY FORD offers to take over Muscle Shoals on terms which may be summarized as follows:

(1) He is to buy the two nitrate plants, the Waco quarry and the steam plant for $5,000,000.

(2) The Government is to pay for the completion and maintenance of both dams, and build locks in connection with them.

(3) He is to get a 100-year lease on the dams and power plants, renewable in perpetuity.

(4) He is to pay $1,680,000 a year for 96 years as interest on the Government's investment in the dams and power plants, and $46,547 a year for 95 years to be invested at not less than 4% as a sinking fund.

Congress is now deciding, amid much tumult and shouting, whether it will accept these terms. No other offer worth considering has been received.

Mr. Ford says that Muscle Shoals presents an unprecedented opportunity for service to humanity. He would use the Shoals as the focal point for all his humanitarian ideas. He would have the Government pay for the dams by issuing paper currency against units of energy to be produced by the power plants, and thus demonstrate the needlessness of a gold standard, confound the international bankers, and pave the way for the end of wars, which (he says) the bankers cause to be waged for their own benefit. He would develop on the banks of the Tennessee factories using the labor of

(*Turn to page 1252*)



Basic Commodity Prices

(Minimum, at New York, unless otherwise specified)

	Week Ending July 1	Week Ending June 24	Year Ago
Aluminum, pig (ton lots), lb.	.17	.17	.225
Antimony, ordinary, lb.	.0575	.0525	.0512
Brick, Hudson R., per M.	20.00	20.00	15.00
Cement, Portland, bbl.	1.70	1.70	2.15
Copper, Electrolytic, lb.	.1375	.1375	.1275
Cotton, spot, Mid. Upl., lb.	.2221	.222	...
Hides, Chic. Pack., No. 1, lb.	.17	.17	.14
Lead, N. Y., lb.	.0575	.0575	.0445
Petroleum, cr., at well, bbl.	3.50	3.50	2.25
Pig iron, Bessemer, Pgh., ton.	26.96	26.96	24.46
Pine, roofers 6 in., M. ft.	33.00	32.00	28.00
Rubber, Up River, fine, lb.	.18	.18	.155
Silks, Sinshui, No. 1, lb.	7.40	7.30	5.75
Spelter, N. Y., lb.	.0565	.0565	.0445
Steel Billets, Bess., Phg., ton.	35.00	35.00	37.00
Tin, N. Y., lb.	.3062	.3137	.2875
Wool, Dom., ½ blood com., lb.	.50	.50	.30

Wholesale Commodity Prices

Coal—			
Bit., ¾ in., lump, net ton	...	...	...
Anthracite, egg, net ton	...	...	...
Coke, furnace, net ton	7.50	6.50	3.00
Cotton Goods—			
Brown Sheetings, Std. yd.	.13	.13	.0925
Standard Prints, yd.	.1025	.1025	.11
Print Cloths, 38½ in., 64x60, yd.	.085	.085	.06375
Drugs and Chemicals—			
Alcohol, ethyl, form 5, gal.	.30	.30	.37
Alcohol, wood, 95%, gal.	.57	.57	.85
Alum, lump, lb.	.0375	.0375	.0375
Bleaching Powder, over 34%, 100 lbs.	1.60	1.60	2.15
Borax, crystal, in bbl., lb.	.06	.06	.06
Caustic Soda, 76%, 100 lbs.	3.75	3.75	4.10
Lime, factory, 200-lb. bbl.	1.90	1.90	...
Nitric Acid, 42°, lb.	.065	.065	.0725
Saltpeter, crystal, 100 lbs.	.0775	.0775	...
Soda Ash, 58% light, 100 lbs.	1.75	1.75	2.00
Sulphuric Acid, 60%, 100 lbs.	.50	.50	.60
Flour—			
Spring Pat., 196 lbs.	7.40	7.40	8.25
Winter, soft str't, 100 lbs.	5.50	5.50	6.60
Grains—			
Wheat, No. 2 Red, bu.	1.305	1.2875	1.475
Corn, No. 2 Yellow, bu.	.8087	.8125	.8125
Oats, No. 3 White, bu.	.465	.455	.455
Rye, No. 2, bu.	.99½	1.005	1.385
Barley, malting, bu.	.74	.73	.77
Hay, No. 1, 100 lbs.	1.40	1.40	1.35
Straw, lg., rye, No. 2, 100 lbs.	1.95	1.90	1.05
Hides—			
Cows, heavy native, lb.	.165	.16	.11
Country, No. 1 steers, lb.	.12	.12	.08
Iron and Steel—			
Basic, Valley furnace, ton	25.00	25.00	20.50
Steel bars, Pittsburgh, 100 lbs.	1.70	1.70	2.00
Beams, Pittsburgh, 100 lbs.	1.70	1.60	2.00
Galvanized Sheets, No. 28, Pittsburgh, 100 lbs.	4.15	4.15	4.75
Leather—			
Hemlock, sole, No. 1, lb.	.29	.29	.28
Scoured oak backs, No. 1, lb.	.45	.45	.55
Lumber—			
FAS Qtd. Wh. Oak, 4/4" M. ft.	145.00	145.00	145.00
Tonawanda Wh. Pine No. 1 barn 1x4", M. ft.	82.00	82.00	90.00
Adirondack Spruce, 2x4", M. ft.	38.00	38.00	48.00
No. 1 Com. Y. Pine Bds., 1x4", M. ft.	44.75	44.75	37.00
Oils—			
Coconut, spot N. Y., lb.	.085	.085	.1125
Crude, tks, f.o.b. coast, lb.	.0687	.0687	.08
China Wood, bbls., spot, lb.	.1350	.1375	.15
Cottonseed, lb.	.1225	.1225	.0735
Linseed, city, raw, gal.	.92	.90	.76
Paraffine wax, ref., 125 m. p., lb.	.035	.035	.04
Turpentine, gal.	1.29	1.40	.59
Paints—			
White Lead, in oil, lb.	.125	.1250	.13
White Lead, dry, lb.	.0725	.0725	.075
Zinc., Amer., lb.	.075	.075	.0875
Paper—			
News roll, 100 lbs.	3.50	3.50	5.00
Book SS. & C., lb.	.0625	.0625	.0775
Wood Pulp, ton.	75.00	75.00	100.00

Financial

Bank Clearings	Week Ending July 1	Week Ending June 24	Year Ago
New York	$4,776,955,074	$4,501,976,257	$4,412,846,410
Chicago	548,808,001	534,629,616	486,263,952
Entire Country	8,060,000,000	7,918,000,000	7,438,000,000
Increase or Decr.	+8.3%	+22.9%	19.8%

(Per cent of total from preceding year)

Cost of Money— New York	Week End. July 1	Week End. June 24	Year to Date	Year Ago
Call Loans	5½@4	5@2¾	6@2.75	6@5
Time Loans (60-90 days	4	4@3½	5@3½	6
Six Months	4¼@4	4@3¾	5@3¾	6
Com.Discount,4-6mos.	4½@4	4¾@4	5@4	6½@6¼

Financial Transactions	Week Ending July 1	Week Ending June 24	Year Ago
Stock Sales, shares	3,418,576	4,763,831	2,760,688
Aver. Price, 25 Railroads	62.82 h. 61.01 l.	62.35 h. 59.30 l.	52,26 h. 50 l.
Aver. Price, 25 Industrials	99.54 h. 96.25 l.	98.64 h. 94.01 l.	74.43 h. 72.50 l
Sales of Bonds, Par Value	$58,153,350	$72,758,600	$50,737,150
Aver. Price, 40 Bonds	79.95 h. 79.80 l.	79.95 h. 79.47 l.	68.96 h. 67.93 l
Average Net Yield, 10 High-Grade Bonds	4.545%	4.560%	5.541%
New Security Issues	$26,555,000	$72,500,000	$19,000,000

Business Failures	Week End. June 29	Week End. June 22	Year Ago
Number	364	391	303
	May, 1922	Five Months	May, 1921
Liabilities	$44,402,886	$335,473,888	$57,066,471

Industrial

Building Permits (156 cities)	May, 1922	April, 1922	May, 1921
	$228,875,188	$192,184,353*	$133,063,676

*142 cities.

Idle Freight Cars	May 31, 1922	May 15, 1922	April 22, 1922
Number	486,846	518,758	540,272
Car Loadings	June 17, 1922	June 3, 1922	May 13, 1922
Number	860,722	750,645	777,350
Steel and Iron Barometer	May 31, 1922	April 30, 1922	May 31, 1921
U. S. Steel Orders (tons)	5,254,228	5,096,917	5,482,487
Daily Pig Iron (Prod.) tons	74,409	69,070	39,394
Monthly Pig Iron (Prod.) tons	2,306,679*	2,072,114†	1,221,221*

*Month of May. †Month of April.

Foreign Trade	May, 1922	April, 1922	May, 1921
Exports	$308,000,000	$318,100,447	$329,709,579
Imports	254,000,000	217,025,082	204,911,186

Structural Steel Awards—Total sales for May, 146,900 tons, at the rate of 92% of capacity.

Sugar—			
Cent. 96°, 100 lbs.	4.73	4.73	4.00
Fine Gran., in bbls., 100 lbs.	6.20	6.20	4.20
Wool—			
Boston Aver. 98 quot., lb.	.7401	.7348	.40073
Stand. Clay Wor., 16-oz., yd.	3.72	3.72	2.85
Fancy Cassimere, 13-oz., yd.	2.45	2.45	2.125
Serge, 36", Wor., yd.	.52	.52	.52
Broadcloth, 54", yd.	2.75	2.75	2.50
Cottonwarp serge, 36", yd.	.45	.45	.45



Money Rates Bear Watching

CANNY investors these days are watching money rates closely. A sustained rise in interest rates, the experts tell us, is one of the surest signs of the end of a rising security market. Since prices on the New York Stock Exchange have shown a decided wavering tendency lately, it has become increasingly necessary to watch fundamental factors such as money rates to know just where one stands.

Two outstanding events in the money market in June were the reductions in discount rates by the Bank of England and by the New York Federal Reserve Bank. Both these events gave courage to bulk speculators for the long pull, who interpreted them as indicating that, whatever the stock market might do today or tomorrow, security prices, in the long run, are still on the upswing.

The central banks, in thus reducing their rates, gave recognition to a condition that had long since shown itself. Long before the New York Federal Reserve Bank reduced its rate to 4%—the figure, by the way, from which it was raised when credit first tightened in 1919—the actual drop in interest rates in the open money market had been registered by the rise of the 4¼% Liberty bonds above par and the setting of a 3½% rate by the United States Treasury on a new short-term loan.

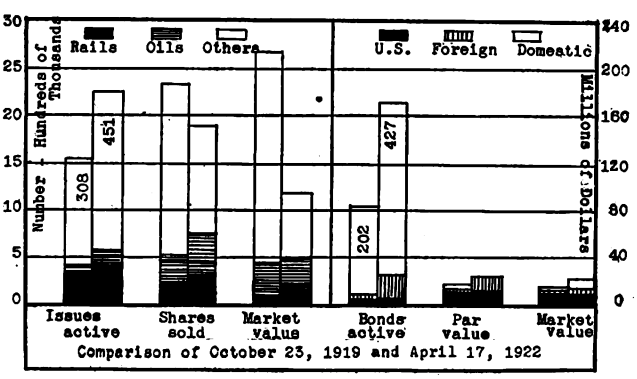
Those who hailed with satisfaction the continued drop in money rates throughout June were not discouraged by the fact that call money rose sharply at the very end of the month. This tightening, they said, was merely temporary, due to the approach of the July 1 settlements. It indicated the withdrawal of money from New York to banks in the interior, a reversal of the recent movement that brought interior funds to New York to aid the Government in making its June 15 payments. Some bankers said that the tightness would continue until the July 1 payments had been taken care of, whereas others expressed the opinion that the increase in interest rates would bring out idle funds that would quickly force the rates down again. No one seemed to think that the tightening was more than temporary. The opinion remains that money rates will soon resume their downward movement.

The Mexican Petroleum Flurry

MEXICAN Petroleum excited the stock market in the closing half of the month. This, and a few other highly speculative shares, led the trading over a period that would otherwise have been dull. The sensational rise in Mexican Petroleum, which increased 40% in market value in only eight days, induced the Committee on Business Conduct of the Exchange to conduct an investigation into dealings in the stock. The committee found nothing to call for official discipline. Nevertheless, the actions of the stock made it quite clear that a group of speculators had achieved something resembling a corner, and administered some nasty blows to a venturesome short interest. The rise in Mexican Petroleum was accompanied by the announcement of a highly favorable annual report of the company's business; but the report, though it showed an increase of nearly $7,000,000 in annual profits, was not sufficiently unexpected to justify so violent a jump in the price of the stock.

"Whatever the exact facts of the matter, open manipulation of a corner has not characterized this episode," says the New York *Times* of the Mexican Petroleum flurry. "Such an undertaking would be doubly dangerous because of the attitude of the Stock Exchange authorities and because of its effect on the rest of the market.

"The immediate effect of this abnormal and artificial movement was what always happens first on occasions of the sort —a half-panicky rush of short sellers in other stocks to buy back their shares. The next was to cause doubt and hesitation in the market. The exceedingly bad effect of such episodes on confidence in the machinery of the stock market are well enough known to explain that second attitude."



The Difference Between a 2,000,000 Share Day in 1919 and in 1922.—*(New York Evening Post.)*

Bond Market Still Firm

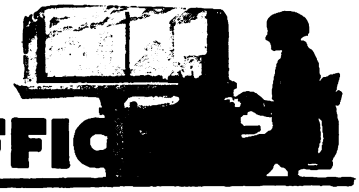
THE bond market in general has remained firm throughout the ups and downs of the stock market. There is some difference of opinion as to what may be expected in the future. Some experts are inclined to doubt that the highest grade issues will go much higher. Brighter prospects are held out for the middle grade and cheaper bonds, which involve a certain amount of risk. As general business conditions improve, it is said, the ability of the corporations issuing these bonds to fulfill their obligations will be clearer, and therefore the prices of the securities will rise. A substantial rise in gilt-edge bonds, however, could not take place without a further substantial drop in money rates, regardless of any improvement in general business conditions.

The Two Million-Share Day

THE great difference in the significance of a 2,000,000-share day on the New York Stock Exchange two and a half years ago and today is strikingly illustrated in the chart herewith. On October 23, 1919, for example, prices then being close to the peak of post-armistice inflation, 308 different issues were traded in on the Exchange; the total sales for the day amounted to 2,325,000 shares; and the market value of these shares was $214,000,000. On last April 17, on the other hand, although 143 more stocks were traded in than on the earlier date, and although total sales ran close to 2,000,000 shares, the market value of these shares was only $94,000,000. In other words, although, as a result of many additions to the list, 46% more stocks were active on the later day, the market value of the turnover was but 44% of that on the earlier date. Put in another way, a 2,000,000-share day during last April provided a turnover equivalent to what would have been furnished by 1,070,000 shares on October 23, 1919. Accordingly, as a result of the lower prices now prevailing, a 2,000,000-share day now represents an amount of business roughtly equivalent to a 1,000,000-share day before the great break in post-war prices.



IN THE MANAGER'S OFFICE



Control of Factory Overhead

OF the three factors in the cost of a product—material, labor and factory overhead—the management can exercise the greatest control over factory overhead. The other two items are determined largely by external conditions. A method of reducing factory overhead by keeping the department head informed of the expenses of his department is outlined by E. F. Lindewirth in *100% Management.*

A list of standing account numbers, or "Card of Accounts," is issued, so that every department will be able to charge each item on a stores requisition or time ticket to its proper account number. As requisitions and time tickets come to the cost department extensions are made and the amounts posted to the cost sheet. One sheet is opened for each department and shows material and labor both in itemized and summarized form. After all entries have been made for the month, totals from the cost sheet are posted to a departmental expense form. This record shows the figures for three years and provides the basis of a budget. Department heads are supplied each month with an itemized record of the expenses of their departments. This presentation of the facts forms the incentive for a campaign of cost reduction within the department.

Cost Department Cooperation

LINKING the work of the cost department with that of general accounting is described by A. T. Rickards in *System:* (1) All supplies are kept in storerooms and may be drawn only on requisitions, copies of which go to the cost department; (2) all workers use time tickets on which time is charged against a job or lot number and the tickets sent to the cost department; (3) all miscellaneous or overhead expenses are distributed departmentally.

These three elements are bound up in determining cost, and each is controlled by an account in the general ledger. Monthly inventories are taken and monthly statements covering all operating expenses are made and balanced with the general ledger account. A separate statement for each department is sent monthly to each department head.

Before this plan was introduced each department supervisor was held responsible for the cost of his department. This supervision, although as close as possible, seldom gave figures which would enable the supervisor to know his monthly position. The accountability of the department head is now actual, a standard cost is established and overhead reduced.

How to Make a Budget

A PLANT manager, relating his experience with budgets in *Factory,* regards an accurate cost system as the whole basis of budgeting. To establish a budget plan it is desirable to have at least three or four years of accurate and detailed cost figures. In addition, an executive is required who has been in close contact with the compilation of such figures.

Costs must be published throughout the plant and the interest of executives, department heads and foremen aroused or the quotas set up will appear unreasonable to some and full cooperation will be lacking. The exact method of cost-keeping is not so important, but it is important that past costs be carefully itemized to obtain shop overhead, or the percentage of expense charged to productive labor. With these data the relation of costs and volume of business may be adjusted to insure almost any reasonable profit desired.

To set up a budget that applies when volume changes, tables are prepared showing the amounts allotted to each major item for each increase or decrease of business based on the range of business expected during the year. These increases or decreases may be assigned values in proportion to the size of the plant. Assuming that the minimum business is likely to be $120,000 monthly and the maximum $240,000, the tables are made to show allowable expenditures in each department for an incoming monthly business of $120,000, of $130,000, $140,000 and so on up to $240,000.

With these budget sheets prepared in detail for each department, the announcement at the beginning of the month that a certain quota of business is expected constitutes a notification to department heads of what their allotted expenses may be. These predetermined figures are a convenience for the executive and save valuable time. Each month a complete report of actual performance is issued and compared with the budget figures set.

The Why of Scientific Planning

ONE of the most profitable results of scientific planning is the ironing-out of the seasonal curve in industries whose production is governed by the period of the year. Howard H. Wiley, in *100% Management,* describes a control of the seasonal factor which has warranted an increase in production during the dull season from 20% to 90% normal capacity. The production department lays out its plan for a six months' period. Each job is analyzed by the planning department and a detailed schedule worked out. The date of delivery being known, by working back through the schedule the time each class of material is needed can be determined. When these details have been worked out, the schedule is posted on the planning board, where it becomes a graphic record of essential information. The head of each department knows in advance what he will have to handle and when. The schedule shows at a glance all open time and thus becomes a basis for the work of the sales department.

As all planning is done before the work reaches the plant, productive work begins immediately and by a simple follow-up is kept up to schedule. This follow-up, or daily report of work in process, is made by the shop clerk or timekeeper, and shows the machines operating, the job and the number of pieces processed. From this record the production manager can detect any departure from schedule, investigate the cause and remedy the difficulty before it becomes serious.

Scientific planning promotes greater efficiency in every department, increases the effectiveness of the sales department, coordinates the work of all departments and enables the plant to deliver in contract time.

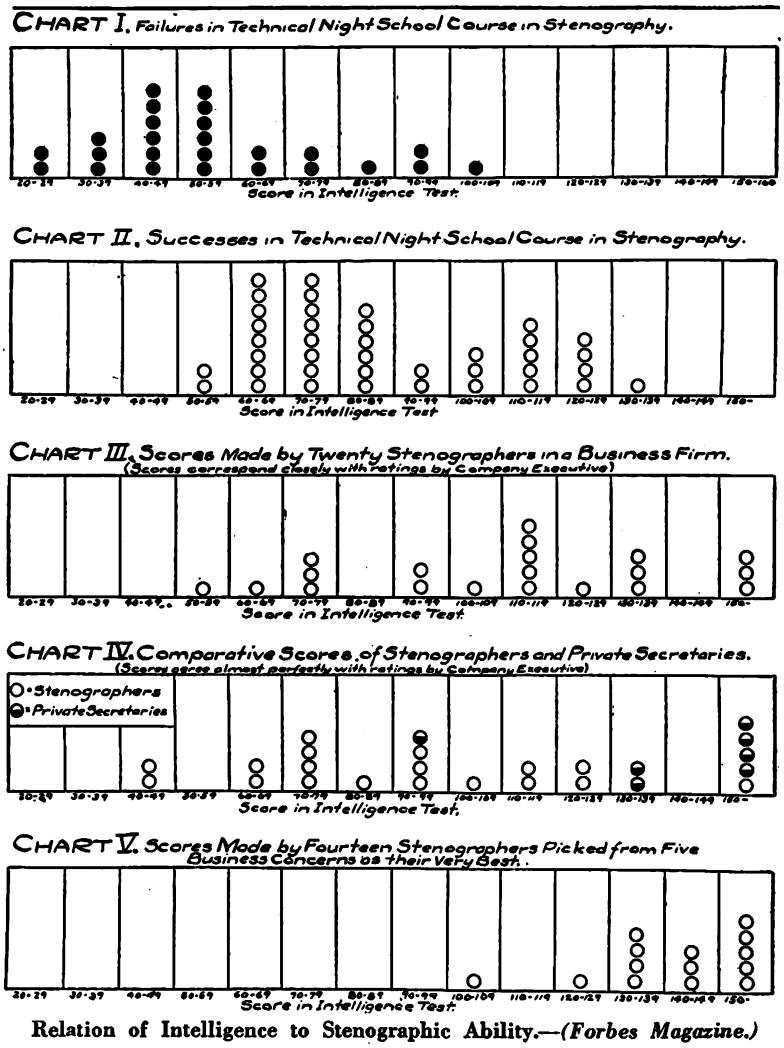
Testing the Clerk's Intelligence

THE use of intelligence tests has been confined more or less to the selection of junior executives, skilled factory workers, or salesmen. H. G. Kenagy in *Forbes* believes that the application of such tests to office workers—clerks, typists, stenographers and secretaries—would increase the efficiency of the average business office by as much as 50%. The degree to which intelligence is a factor in clerical efficiency is much

greater than most employers suppose. In the situation illustrated by the chart on this page, an intelligence test differentiated between good and poor stenographers with more than 84% accuracy.

Companies which have established training schools for the development of workers have experienced the fact that many unfitted, but enthusiastic, employees take up courses which they later drop. An intelligence test would eliminate those who are not mentally able to pursue the subject chosen. Charts I and II indicate that a test score of 60 is a good dividing line between success and failure in selecting applicants for a training school. Each dot or circle in these two charts represents one individual in the school.

The same test applied to stenographers actually employed in a business office confirmed the statement that a certain level of general intelligence is essential to satisfactory stenographic work. Results are indicated in Chart III. A second group to which the test was applied consisted of both stenographers and private secretaries. Chart IV shows the average higher intelligence required for secretarial work. In Chart V is pictured the scores made by fourteen stenographers rated by their employers as exceptionally good.



Relation of Intelligence to Stenographic Ability.—*(Forbes Magazine.)*

General intelligence is not the only factor to be considered in selecting office workers but it is one of the most important and has not been given the consideration it deserves. The use of intelligence tests will reduce turnover with a consequent reduction in general overhead.

Importance of Properly Designed Chairs

FATIGUE receives comparatively little consideration by manufacturers, notwithstanding the attention paid it by industrial engineers. The average manufacturer does not seem to realize fully the close relationship of fatigue and production, or to recognize it as an item in manufacturing costs that can be reduced considerably. Irving Salomon, in *Industrial Management,* declares that correctly designed seating decreases unnecessary fatigue more than any other single factor. Of all the causes of fatigue, seating is probably of the greatest importance because it is the most direct.

The practice of purchasing shop or office seating on the basis of what is cheaper to buy, and not what is more satisfactory to the occupant, should be discontinued. A careful analysis of seating requirements should be made in every plant, large or small, not as welfare work, but for the personal benefit gained in greater production.

A chair or seat, to be correct scientifically, must be gauged according to individual differences in stature, either by adjustable features on the e quipment itself or by assorted heights and styles carried in stock. Such seating recognizes each worker as an individual, while a standard non-adjustable chair supplied for all workers on a given operation fails to do so and frequently abuses human organisms.

Height, seat, back-rest and foot-rest are given as the four elements in the construction of seating. The general specifications of these are dependent upon the factors involved in each operation. These factors are: (1) Height of working surface of machine or bench, including obstructions or mechanical interferences below the working surface and interferences in arm movements; (2) Nature of the operation, involving location of supplies, disposition of finished work, leg movements on pedals, whether the operation is repetitive, continuous or varied, and the natural fatigue occasioned by strenuous or monotonous work.

The procedure, in making a study of seating, consists of four steps: (1) Analysis or time study of the operation, dividing it into its various components; (2) Study of the bench, machine or working surface; (3) Design of the stool or chair; (4) Thorough test of a few chairs made according to the specifications.

Dollars from Scrap

WRITING in *100% Management,* E. Karl Wennerlund points out savings possible by the intelligent disposal of scrap. A study of the scrap business disclosed that proper sorting and classifying would result in at least a 25% saving on scrap loss.

A supervisor was placed in charge to advise on the classification of materials and seek the most profitable markets. The actual sales transactions were left in the hands of the purchasing department. As a protection, dealers in scrap were classified and an "approved list" prepared. When a sufficient quantity of scrap or by-products accumulated, dealers on the list were notified to bid and the material disposed of at the maximum price.

Retail Clothing Down 42 Per Cent

Retail clothing prices have dropped 42% since July, 1920, and a further decline is expected, according to the National Industrial Conference Board, which has made a survey of the clothing industry. Between November, 1921, and March, 1922, the average cost of clothing decreased 5%.



The Railroad Strike

NEARLY 400,000 railroad employees were called out at 10 a.m. July 1 by strike orders signed by the six craft presidents of the railroad shopmen's organizations. The text of the strike order follows:

"In compliance with the strike vote, all shop craft employes below the rank of general foremen are hereby granted sanction to suspend work 10 a.m., July 1, on the railroad and Pullman shops in the United States. Notify all outside points. Wire number responding and number remaining at work.

"William H. Johnson, International Association of Machinists.

"J. W. Kline, International Brotherhood of Blacksmiths, Drop Forgers and Helpers of America.

"J. A. Franklin, International Shipbuilders and Helpers of America.

"J. J. Hynes, Amalgamated Sheet Metal Workers' International Alliance.

"James F. Noonan, International Brotherhood of Electrical Workers.

"Martin F. Ryan, Brotherhood of Railway Carmen of America."

The Railroad Labor Board has already taken steps to block the strike by calling railroad executives and union officials before it for a conference. Thus the long-heralded rail strike gets under way. In view of the fact that there is very little possibility of the Labor Board's rescinding its decision, and considering the probability that the Government will step into the breech with injunctions or equally stringent methods to stop the strike, the chance of success for the unions seems slight. Then, too, it is very probable that actions brought by the railroads under the Coronado decision will have a salutary influence in holding back the strikers.

The Harding Administration has already stated that it will take action in case of a railroad strike and will back up the Labor Board's decisions to the limit. Business feeling throughout the country is strongly in favor of the Administration's position and there seems to be no doubt that any action the Government might take would receive the hearty approval of industrial executives. The general public is tired of strikes and little sympathy can be expected from this source. The present likelihood is that the strike will dwindle down to the removal of a few key men from strategic positions, thereby striking the greatest possible blow at the railroads with a minimum withdrawal of men.

In any event, it is certain that traffic will be held up to some extent and this will not improve the situation which will arise next fall when the car shortage will be severe.

Of course the important factor in the coming car shortage is the renewed shipments of coal when and if the strike is ended this fall. Industrial fuel stocks are being depleted at the rate of about 10,000,000 tons a month, and consequently there will be a rush to lay in the winter supply once the strike seems to be on the way to settlement.

Coal Strikers Holding Firm

THERE has been so far no weakening on either side of the coal deadlock. The mine unions have been organized well enough to hold their forces pretty well in line and although one-third of the bituminous coal in this country is mined by non-union workers, the country cannot long tolerate the present union inactivity. Even if the strike should be ended immediately there would be a coal famine of no small dimensions this fall. Should the strike run through the summer, conditions will be actually very serious and will certainly damage industrial prosperity in a very direct manner.

The suggestion that factories purchase their winter requirements in advance at this time would do more harm than good, because it would simply accelerate the famine. The wise course is for everyone to protect himself for not more than two or three months and use every influence to have coal production resumed before the supply is exhausted.

Public opinion was apathetic about the mine strike up to the moment of the Herrin disaster. This miserable affair in Illinois has done the union's "reputation in men's eyes" good. The situation in this regard is well summed up by an editorial in the *New York Evening Post:*

"Not a word can be said in extenuation of the atrocities perpetrated at Herrin, Ill., by a mob of striking coal miners. It is the worst blot on the record of union labor in this country. Armed warfare in industrial disputes is bad enough, but what took place at Herrin was not war but massacre. There were apparently no casualties in the course of the actual "battle." Prisoners who had raised the white flag were shot down in Mexican bandit fashion. The blow is all the worse for labor because it implicates a body of workers who have hitherto conducted great strikes with perfect discipline. Only the other day President Lewis of the United Mine Workers took occasion to boast of his union's good record in this respect. And the blow is all the worse for labor because the blood-madness that seized upon the Herrin strikers seems to have been more than the ordinary wrath against professional strike-breakers. This time it was directed against a strike-breaking union. The fury was the fury of civil war.

"Yet for the very reason that a section of union labor which has hitherto acted with self-restraint has surrendered to the spirit of war without quarter the lesson of Herrin bears down on the conscience of the nation at large. The tragedy might have been averted if Government intervention had made itself felt in a strike that intervention could have settled. It has been a coal strike in which both sides have made knowingly impossible demands which called for an umpire and a decision that both sides would have accepted. The policy of letting the two sides fight it out has only brought about a startling demonstration of industrial warfare at its worst: on the one side, armed mobs and murder; on the other side, the professional strike-breaking agency, strike-breakers hired under false pretences, armed guards, and the power of the State seemingly acquiescent.

"The methods of industrial controversy must be civilized if we are not to have uprisings against civilization like that in Illinois."

Various newspapers place the blame for the outrage on the union miners, others on the operators and still others believe that the Federal Government is to blame. The *Brooklyn Daily Eagle* states the matter thus:

"The mine where the trouble occurred is an open one and does not require certified miners. Since the strike it has been operated under some kind of an agreement with the mine union officials, who permitted union men to get out coal for local consumption. It is charged that the mine owners broke this agreement and employed non-union men and members of the Steam Shovelmen's Union, which has been under the ban of the Federation of Labor. Incidentally, the mine owners are not members of the general operators' organization.

"All this is of minor importance, but it indicates quite clearly the chaotic conditions that led up to a wholesale murder that is a disgrace to the country. Running through the story are half a dozen organizations having to do with mining and the maintenance of law and order. The most amazing thing about the massacre is the utter complacency of everyone connected with these various agencies. At every turn we find men who are supposed to represent power, but no one has appeared who seems to represent responsibility.

"On one side there are the 'regular' mine union officials, headed by John L. Lewis. He had the power to call the mine strike and to decide that the Steam Shovelmen's Union was 'an outlaw organization' and that its members should be treated as 'common strike-breakers,' the law in this case being union law. Since the massacre Mr. Lewis has dropped out of sight and has had nothing to say. His responsibility apparently ended when he sent a telegram defining the status of the men working the mine. The status of most of these men has been much more definitely determined since Mr. Lewis sent his telegram. They are dead.

"The Federation of Labor, with Mr. Gompers at its head, is above the United Mine Workers. The Federation is in convention, making its own laws and attempting to make laws for the rest of the country, incidentally overturning the Supreme Court and the fundamentals of the Constitution. Yet the Federation and Mr. Gompers have done no more than 'deplore' the violence in Illinois and upbraid the operators.

"But there is lack of responsibility on the other side as well. The question whether the mine owners violated their agreement with the unions is important and should be thoroughly investigated. Also the details as to the employment of men who charge that conditions were misrepresented and the alleged use of a machine gun against strikers before they had attacked the mine. This, however, only leads up to the main fact that forty or fifty men have been brutally murdered."

Public Opinion Being Crystallized

THE trouble at Herrin, Ill., seems to be the climax of industrial disputes in this country and as the National Industrial Conference Board says in its *Weekly News Survey:*

"This industrial warfare . . . is rapidly crystallizing public opinion against labor disputes in general. While the number of disputes between employers and employees has been steadily decreasing during the last two years, it now has reached a total of somewhat over 100 per month as against a monthly average of 190 in 1921 and 370 in 1917.

"The Big Four Railroad Brotherhoods, representing the conductors, engineers, trainmen and firemen, and generally regarded as conservative unions, have been requested by the United Mine Workers of America at a joint meeting to agree not to transport coal from non-union mines with the expectation of further crippling the coal supply and forcing an early capitulation of the coal operators.

Textile Strikers Tiring?

THE *New York Sun* states that the textile strike in New England is having the effect of driving employees out of the district. Some 6000 skilled workers having left Rhode Island for Northwestern Canada and the Province of Quebec to engage in agriculture. But the textile strike is apparently wearing itself out. According to the *New York Journal of Commerce,* the ability of the strikers to hold out for so long a period can be attributed to the lack of unanimity among the manufacturers themselves. Throughout New England there are many plants that have held aloof from the struggle and are not following the Rhode Island mills in reducing wages 20%. New Bedford and Fall River are notable examples of this and none of the mills in these cities have as yet made any move toward falling in with the mills in the strike arrangements. With part of the mills reducing wages and part of them increasing from 48 to 54 hours per week and part of them continuing on the 48-hour basis, strikers have received the idea that a wide difference of opinion exists among the manufacturers and have derived from this idea not only moral support to continue but also have received large sums of money from sympathetic working employees.

With a condition of this sort existing, the strike will probably continue for some time to come, but it is certain to diminish in effect as mills go back into operation.

A Record of Strikes

ACCORDING to the *National Industrial Conference Board* the U. S. Bureau of Labor gives the number of strikes and lockouts since 1916 as:

	1916	1917	1918	1919	1920	1921
January	188	288	191	199	227	228
February	206	211	223	198	192	168
March	294	318	312	192	279	181
April	434	445	321	270	406	284
May	617	463	392	431	409	566
June	354	323	296	322	304	146
July	313	448	288	379	292	137
August	326	360	278	412	259	139
September	252	349	212	406	227	121
October	261	322	145	327	189	84
November	197	257	208	160	104	81
December	149	197	250	125	97	65
Month not stated	198	469	237	156	269	67
Total	3789	4450	3353	3577	3254	2267



(Philadelphia North American)

Slow down; dangerous curve ahead



(New Orleans Times-Picayune)

Company coming?

Small Chance for Railroad Strike Success Shown Here



Exports in All Lines Improving

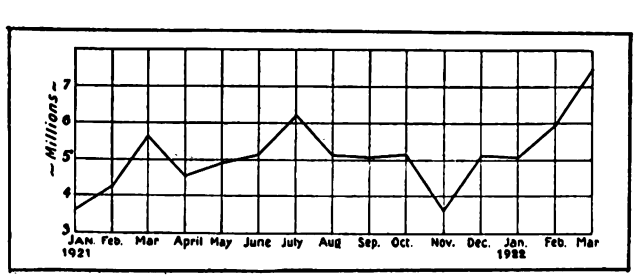
EXPORT trade with European countries continues to show an encouraging increase. In an article in the *Amexa News,* the official organ of the American Export Association, H. H. Harvey states that the improvement in export business extends to nearly all lines. This opinion is based upon answers received from a questionnaire recently sent out to 1000 manufacturers embracing almost every line of industry. Replies were received from 75% of these manufacturers.

Over 85% of the answers portrayed a hopeful frame of mind, based on actual foreign inquiries or orders. Less than 15% of the replies displayed a pessimistic attitude. Fully 50% of the replies indicated a material improvement in the actual number of orders received, but all of the 85% of optimistic answers were based on a decided improvement in foreign interest in American goods. It is believed that subsequent months will show a continuance of this steady upturn. In regard to the credit situation the *Amexa News* points out that while new facilities which have been developed in the last eight years for the financing of our foreign trade are not intended to provide credit where no basis for credit exists, they will enable existing credit to be utilized more fully, flexibly, surely and economically than heretofore. These facilities include:

1. Branches of American banks in foreign countries.
2. Foreign-trade banks with head offices in the United States and branches abroad.
3. The right of American banks to accept and the development of a discount market.
4. The readiness of our issuing houses and banks and of our investors to absorb immense quantities of foreign securities, creating an immense purchasing power here for export purposes.

Foreign Trade Financing

ACCORDING to the *Mid-Continent Banker,* the relation of the American banker to the work of securing and developing foreign trade is of outstanding importance. It is pointed out that foreign-trade financing is primarily a long-term credit proposition as contrasted with the short-term credits of domestic trading. Just as no banking system could have prevented the industrial depression of the world, no banking system can at once restore prosperity. Before the American banker can assist in restoring foreign trade there are some preliminary and absolutely essential things which must be done by Europe. Chief among these are (1) Political and social peace must be established in order that the normal processes of wealth creation can function. (2) Europe must abandon her wartime policies. This means not only a reduction in armies, navies, and other military expenditures, including repressive taxation, but also the wartime regulation of business, as well as the doles and other gratuities granted to the unemployed, or conceded to the employed as an unduly high wage. (3) There must be industry and saving, such as Europe has never known, in order that a beginning can be made in solving the problems of balanced budgets, inflated currency and unstable exchanges.



Imports from Germany into New York customs district from Jan. 1, 1921, to March 31, 1922, by dollars—*(Union Trust Co., Cleveland.)*

The World Is Buying Motor Cars

A DEFINITE recovery in the automobile export business earlier than was at first thought possible is predicted by leaders of this industry. The value of April, 1922, exports are the highest since January, 1921, representing a figure a third to a half higher than many other months, and it is predicted that subsequent months will show a continuance of the steady upturn.

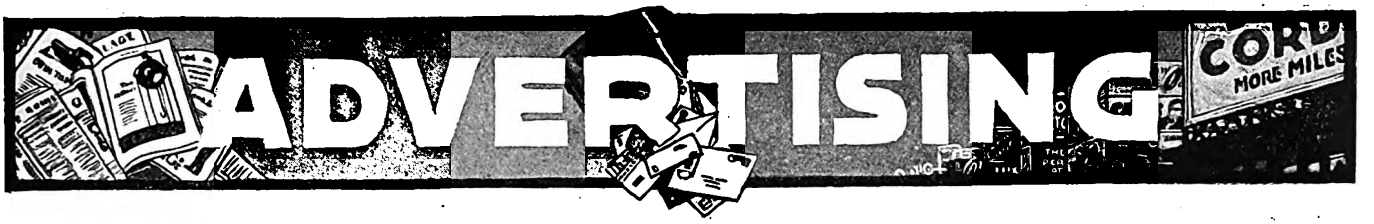
The imports of motor vehicles is increasing in Great Britain. The total number of passenger cars and trucks imported during the first quarter of 1922 was valued at $461,328; and number of chassis 2370, value $479,009. During the corresponding quarter of 1921 passenger cars and trucks imported amounted to 2914, valued at $681,156; but imported chassis numbered only 963, valued at $314,863.

Canada is reported to have ranked first as a source for the number of finished cars and fourth with respect to chassis. France ranked second with regard to both finished cars and chassis. Italy was third for finished cars and first for chassis, while the United States was fourth in finished cars and third in chassis. The automotive market is also said to be improving in Portugal, Syria, Peru, Brazil and Greece. In this last-named country American cars predominate, 65% of the cars being of American make.

Our Far Eastern Markets

THE determination of American exporters to find a market for their products is leading many of them to consider the trade possibilities offered by the Orient, particularly by Japan. Although exports from the United States to Japan are much less than in 1919 and 1920, there is a considerable gain over those of the pre-war period. The largest item in the list of American goods going to Japan is raw cotton, which in 1920 amounted to 339,000,000 yen. The next largest item in that year was 1,600,000,000 yen for semi-manufactures of iron bars, rods, plates, sheets, wires, pipes and tubes. Machinery and machine parts, autos, railway cars and parts, lumber and construction materials are among the other commodities that were bought in considerable quantities. In a recent issue of the *Editor and Publisher* it is pointed out that the tendency toward standardization along Western lines may be expected to increase the Japanese market for foreign goods.

As a result of the Washington Conference, the opportunities for trade with China have been greatly increased. Previous to the Conference American trade was handicapped in many ways, almost every other nation operating under so-called concessions which resulted in lesser import duties for their goods. Yet even under these conditions, during the two years following the war the United States had a substantial part in Chinese business, and it is believed that in the near future new markets for many products will be found in China.



Indirect Trade Marks

A GREAT deal has been written about the value of trade marks, the cumulative value acquired by year after year of consecutive insertions in magazines and newspapers. But little has been said about the indirect value of advertising style. Advertisers who for years have been employing a certain style of border, or peculiar type arrangement, or distinctive illustrative treatment have found that the indirect trade mark value is sometimes as great as that of the actual trade mark. The use of a peculiar style of border ties up a series in a way that cannot be accomplished by any other means; provides a link by which the reader may recognize any insertion as part of a series and forms as integral a part of the advertising campaign as does the copy itself. The use of some mark or method of treatment not only acquires a very definite trade mark value over a period of time, but in addition the reader will be influenced to purchase the product quite as much by the style as by the copy.

Style is generally recognized as the best method of obtaining that indefinable quality of atmosphere so much desired. It is evident that if any particular advertisement carries the impression of "atmosphere" which is needed to put across the campaign, a series run in the same style will work out much better than a number of different styles carrying different "atmospheric" impressions.

In the illustration at the foot of this page, the experienced advertising man or the casual reader of periodicals will have no difficulty in spotting the advertiser who uses the distinctive illustrative method shown in the first example.

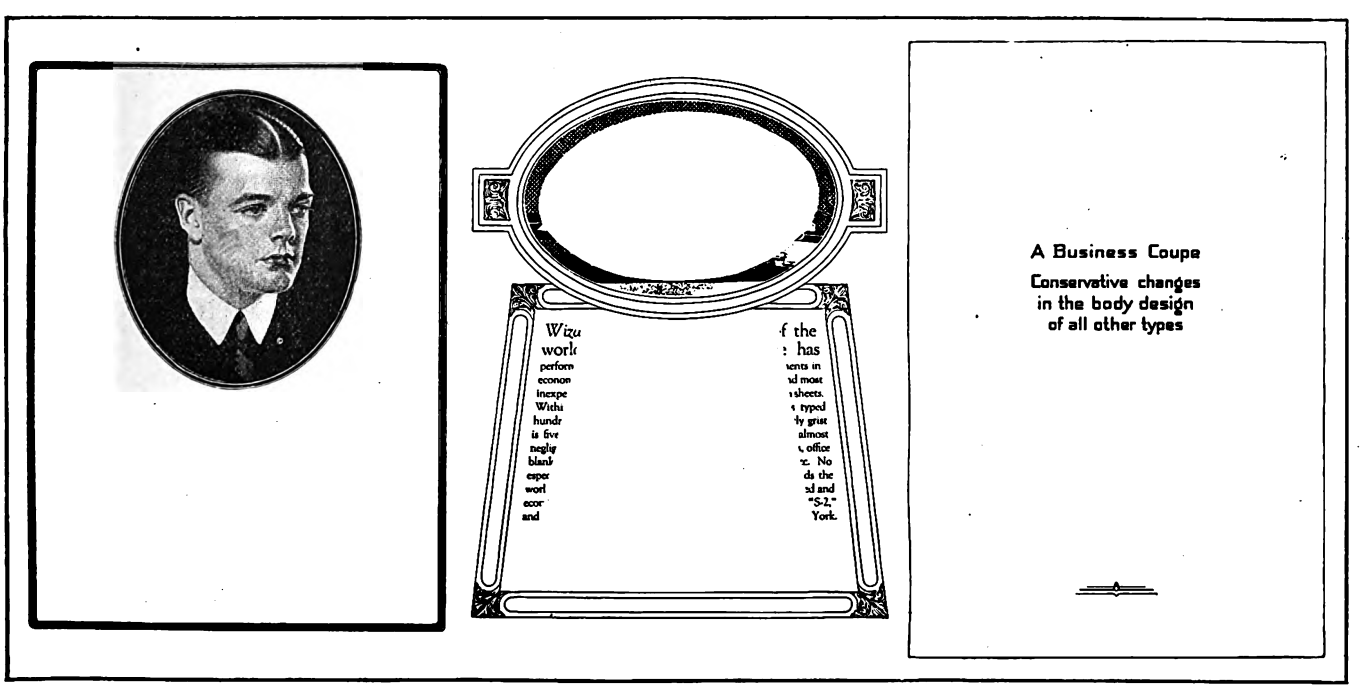
There are perhaps a dozen collar advertisers using national mediums, but there are none whose copy could be confused with that of the well-known advertiser who uses the style shown below. The remarkable effect achieved by the peculiar border arrangement in the second example stamps the identity of the advertiser upon the reader's mind quite as thoroughly as the trade mark.

The automobile advertiser who uses the peculiar lettering in the third example has "registered" the copy to possible purchasers by newspaper and magazine copy as well as by periodicals and booklets. The style has value of its own.

How much weight does the style of your advertising carry? Cut out of your advertisement all reference to your product and see if those not particularly acquainted with your advertisement will instantly recognize it as your own. If not, there is probably something to be gained by adopting the method of indirectly trade-marking your goods.

How to Buy or Build a Mailing List

OCCASIONALLY the man who is conducting many mail-order campaigns for concerns in various lines of business runs into a situation where he finds himself in need of a mailing list of a certain class or type of people that can only be built, that cannot be bought. The weakness of most purchased mailing lists is that the names given are the firm names and not the names of individuals. Whether this weakness will affect the success of a campaign series addressed from the list depends upon the classification. If the narrowing down of the appeal will produce greater results the general list should be eliminated and a special list be bought or built. The following sources for mailing lists are suggested by Verneur Edmund Pratt in *The Mailbag:* (1) trade directories, phone books, rating registers; (2) mailing-list companies; (3) chambers of commerce (city, State, nation); (4) registration and license bureaus; (5) vital records (births, marriages, deaths); (6) house salesmen; (7) purchasing actual inquiry letters; (8) club, association and league membership lists; (9) clipping bureaus; (10) special and unusual sources.



Try this on your advertising friends. Characteristics that mark and help to immediately identify advertisements apart from trade marks, names or illustrations of the object.

AUTOMOTIVE

Automobile Production Records Broken

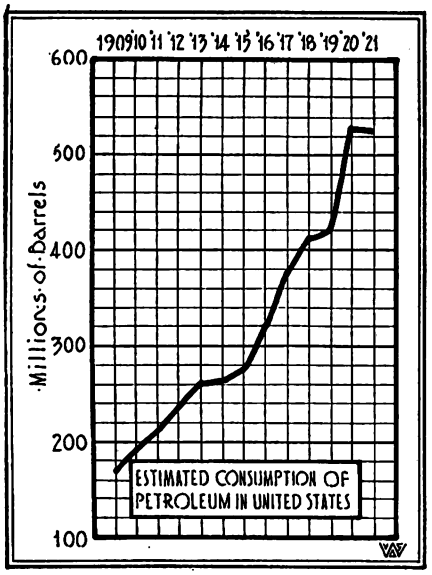
THE highest production record in the history of the automobile industry was reached in May, the output of 252,000 passenger cars and trucks exceeding the previous high mark by 32,000. It has been impossible to accumulate reserve stocks of passenger cars and all factories are now forcing production to keep pace with demand. The rapid pace at which cars have been manufactured has increased production costs. Shipments of parts by express, orders by telegraph and premiums for raw materials add to the expense of turning out motor vehicles on which the unit profit is much smaller than it was before the era of keen competition forced by business depression. However, this increase in production costs appears to have had a stabilizing effect on retail prices and few revisions are in prospect except in the truck field, where the return to normal conditions has not been completed.

The most popular topic of discussion within the industry, says *Automotive Industries,* is the outlook for the remainder of the year. There are reports from Detroit that some manufacturers contemplate keeping their plants running under heavy schedules late in the year to pile up stocks of cars in preparation for a 1923 demand which they expect will be larger than that of 1922. But it is pointed out that there is no reason to expect that sales of motor vehicles next year will be any larger than this, except in the great agricultural districts, and that the piling up of large inventories would be a dangerous expedient.

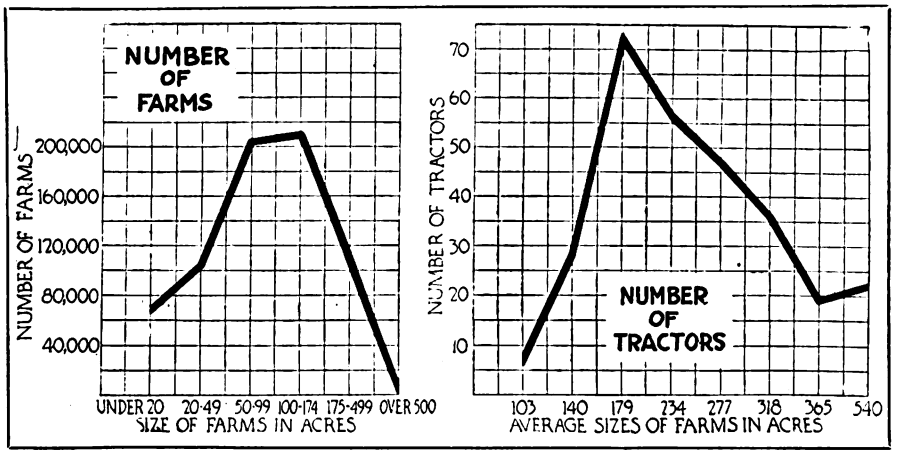
Is Engine Efficiency Increased by Overhead Camshafts? Technical article discussing the advantages and disadvantages of overhead camshafts (and of course, overhead valves), with special reference to efficiency in engine operation. Many splendid examples of American, British, German and Italian overhead arrangements are presented, and discussed, point by point. This is first instalment, consequently, author's conclusions are not presented, but he does point out that it gives (a) a more symmetrical engine, (b) greater accessibility, and (c) this type may be as quiet as another, and contrary to the general impression, is not inherently noisy. P. M. HELDT, *Automotive Industries,* 5-25-22, 5700 w. MAH.

Seven thousand people were killed at grade crossings in 1921.—*Tractor World.*

For Improved Electric Wiring for Automobiles. Author is sales manager for one of the most prominent manufacturers of electric wire and cable for automobile use, and hence, should be fully competent to discuss the subject. He takes up the types of cables and methods of installation used for ignition, starting and lighting circuits, and tells how these may be standardized within certain limits. He urges further standardization, and claims this would add to the usefulness of existing S. A. E. standards for insulated cables. Others references are to splicing, terminals and other details. WILLIAM S. HAGGOTT, *Automotive Industries,* 5-11-22, 1850 w. MAH.



Estimated consumption of petroleum in the U. S., 1909-1921.—*(Magazine of Wall Street.)*



Distribution of corn belt farms by sizes and tractors thereon by sizes of farms.—*(Automotive Industries.)*

Nature of Intercity Motor Traffic. A series of thoughtful deductions from the results of the two road censuses taken by the Connecticut State Highway Dept., in co-operation with the U. S. Bureau of Public Roads. J. G. DOLITTLE, *Power Wagon,* 6-22, 3700 w. MAH.

Rail Cars and Motor Buses Make Good Showing. The showing was upon the occasion of the recent trip from New York to New Haven, over the tracks of the N. Y., N. H. & Hartford R. R. Co., and in one of that railroad's new Mack rail cars. Other members of the party traveled up by motor bus and a third section by regular railroad train. The test was in the nature of a comparison by the picked party of S. A. E. members of the three methods of comparison. The railcars made the trip in 2 hr. 40 mins., the buses in 3 hr. 22 mins., and the special express return train made it in an even 2 hr. Other details are given. *Motor Record,* 6-22, 1300 w. MAH.

"Thermos bottle" cars is an expression stating well the princple of the latest tank cars for the transportation of milk. The large glass-lined steel tanks are exteriorly like to the oil tank cars, which may be cleaned with hot water and soda. As the milk is chilled before it is pumped into the well insulated car, it arrives fresh at its destination.—*Steam Shovel and Dredge Mag.*

Tractor Gearset Has Novel Reverse Mechanism. Description of new design of gearset for tractors which embodies a radical departure. This consists of shifting the entire differential sideways, and this movement brings the gear ring on it into mesh with one or the other of two spur pinions, formed integral with the bevel gears on the intermediate shaft. A drawing is presented and the construction is described completely. *Automotive Industries,* 5-25-22, 450 w. MAH.

An aerial mail service has been established between London and Copenhagen, making it possible for mail posted in London in the evening to be delivered in Copenhagen on the afternoon of the following day.—*Steam Shovel and Dredge Mag.*

Commercial Aviation Development in U. S. Last of series on general subject of commercial aviation progress. In previous instalments, author has taken up in detail each of the principal countries of Europe and Asia, and has described past progress and present status of commercial aviation therein. In this article, apparently the conclusion, he takes up the U. S. in the same way. He predicts that U. S. will lead the world in this direction, within a few years, under certain conditions which he names. W. KNIGHT, *Aerial Age Weekly*, 6-5-22, 5800 w. MAH.

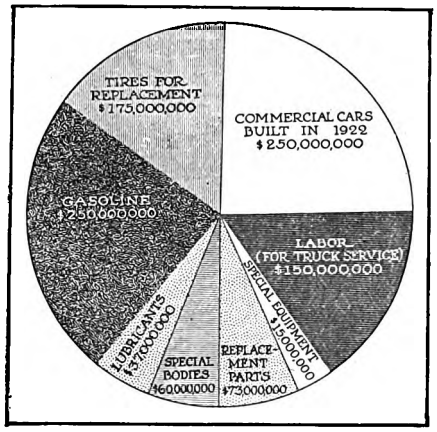
Proposed Air Traffic Law. Professor of the Paris College of Law lays down a series of fundamental laws based upon existing laws which deal with aerial traffic, and with such regulations as have been formulated by various countries. In addition much of this new legal code is anticipatory in nature, in that it is intended to deal which conditions which do not yet exist but are expected to in the near future. PROF. GEORGES RIPERT, *Aerial Age Weekly*, 6-12-22, 4900 w. MAH.

Regulation of Air Traffic. Author points out that present conditions show need for aerial laws, and proceeds to speak of many things which might be regulated by law, to advantage of all concerned. He refers to safety requirements, which deal largely with equipment and testing, with licenses, which deal mostly with the pilot's fitness both as a flyer and as a touring pilot, and with possible aerial traffic rules. DEVALUEZ, *Aerial Age Weekly*, 6-12-22, 1600 w. MAH.

Development of Wright Dirigible Engine for the Navy. Author tells how this new Wright engine, previously described in these columns, was developed for the use of the Navy in its dirigibles. Describes the designing, construction and testing of the engine. GEORGE J. MEAD, *Aerial Age Weekly*, 6-19-22, 2050 w. MAH.

Fighting insects with airplanes is the latest for saving trees. Trees too tall for pump and spray treatment were dusted with a poisonous powder dropped from flying airplanes. A short time afterward, literally millions of insects were found dead on the ground, only about one per cent escaping.—*Steam Shovel and Dredge Mag.*

Larson Tensiometer. Airplane wires must have a certain amount of tension to maintain the alignment of the machine, but this must not reach a dangerously high figure. This new instrument measures through the compression of a spring, the tension in the wire being measured. It is said that tensions can be read to 10 lbs., with only a slight correction due to the beam action of the short section of wire being tested. If proven practical, this simple device will prove wonderfully useful, and will save many lives. *Aerial Age Weekly*, 6-12-22, 1100 w. MAH.

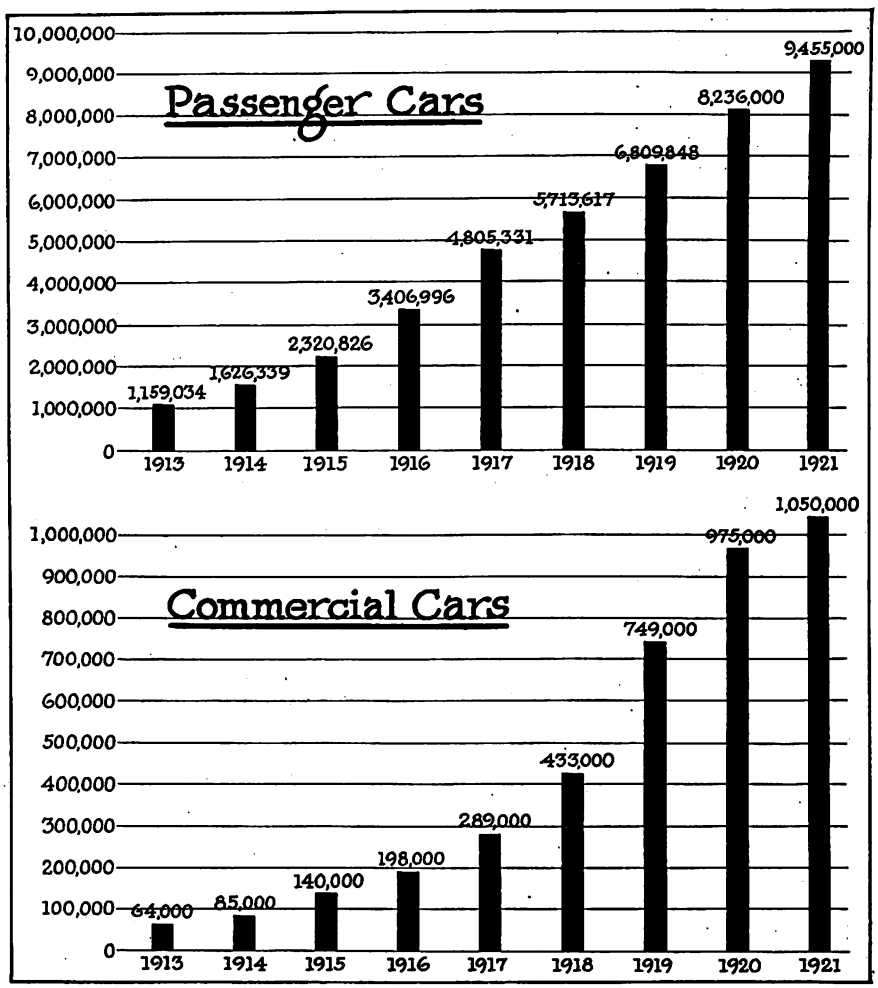


Estimated total sales in the commercial car industry for 1922. Estimated total $1,010,000,000.—*(The Chilton Co.)*

English Fuel Report Shows Possibilities of Alcohol. This is a summary of the report of a sub-committee of the Empire Motor Fuels Committee (British). It shows the results of an extensive series of tests. In these tests it was found that the thermal efficiency was higher with alcohol than with gasoline at all speeds and under practically all conditions. Fuel consumption is higher if the engine is used without change but when changed to higher compression pressures is uniformly lower than with gasoline. Alcohol requires a greater spark advance but showed up equally well under all conditions of throttle variation. Furthermore, the engine ran more smoothly under alcohol. There were other conclusions, most of which seemed to favor alcohol. *Power Wagon*, 6-22, 2500 w. MAH.

New Airless Injection System for Oil Engines. In the Diesel type of engine highly compressed air is used to ignite the fuel which is sprayed in by means of a powerful pump. Some forms of the Diesel engine utilize the compressed air to force in the fuel. In all these engines various details of the air system have given trouble. This article describes the Hesselman engine in which no air is used for oil injection, a special flexible valve taking its place. Drawings of the complete valve, enlarged sketches of the principal spring element, power charts, and other interesting data are presented. EDVIN LUNDGREN, *Motorship*, 6-22, 3600 w. MAH.

A new biplane folds its wings, drops an extra pair of wheels, and proceeds like an automobile along the public highways. It hails from France.—*Steam Shovel and Dredge Mag.*



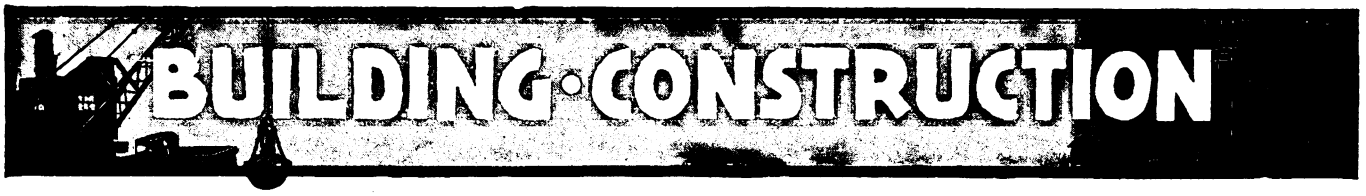
A comparison of the rate of increase of passenger and commercial-car registrations since 1913.—*(The Chilton Co.)*

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Large Building Projects Economical

THE completion of plans by the Metropolitan Life Insurance Company for the construction of four square blocks of houses in Long Island is expected to have an important effect on the housing shortage, not only in New York City, but throughout the country. The maximum cost of these houses is $6,500,000. There will be 50 houses of 39 apartments each, providing for a total of 1950 families in 8250 rooms. The apartments are to rent on the basis of not more than $9 a room and have all modern improvements.

In the opinion of Mr. Stabler, the comptroller of the company, the housing problem in the higher-priced apartments in New York City will be solved by this fall. And it is hoped that the Metropolitan's plan may be adopted by builders of low-rent houses in New York and other large cities. It is believed that speculative builders can put up such structures at a price even lower than estimated by the Metropolitan. The economies to be effected in the construction of these blocks of houses will result in many advantages to the tenants, not only in reduced rentals, but in added conveniences. Each house will occupy half of the lot. Every room is to be an outside room opening on the street, yard, or interior garden, and there will be cross ventilation in each apartment and separate staircases for each eight families. Each building will be isolated with interior garden, rear court and side passageway, developing to the full the principle of "block circulation."

Plea for Standardization in the Building Industry. Article by Government official on advantages following standardization and the elimination of varieties. JOHN M. GRIES, *Permanent Builder*, 6-22, 1000 w. CS.

Architectural Acoustics. Second instalment of article on investigation made of methods for sound proofing three Federal Reserve Bank buildings. PAUL E. SABINE, *Amer. Architect*, 6-7-22, EMcC.

Small Units in House Building. Sixth article, covers roofs and tile walls. A. J. R. CURTIS, *Concrete*, 6-22, 1500 w. CS.

What Shall We Do with Our Clients? Covers relations of architect to client, with special reference to aesthetic values and community. IRVING F. MORROW, *Architect & Engineer*, 5-22, 1500 w. CS.

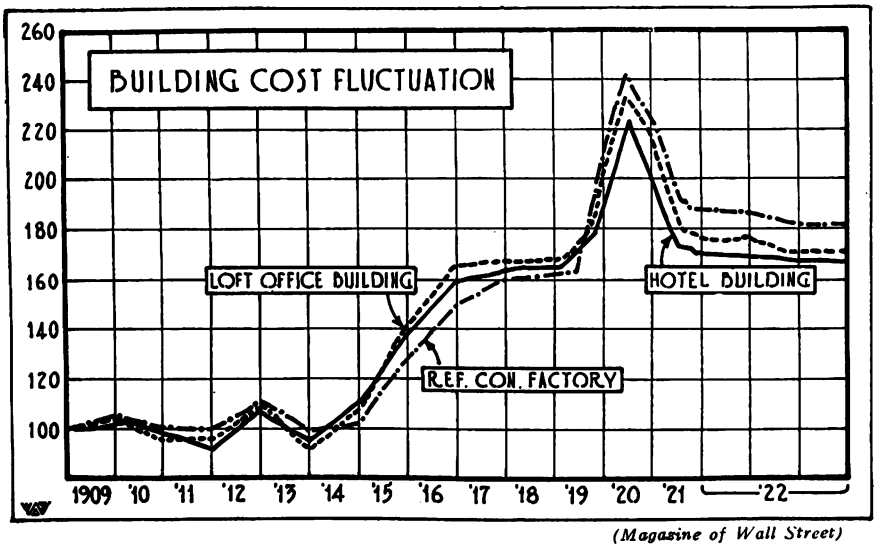
Tentative Minimum Requirements for Small-House Construction. Part I. Summary of preliminary government report on safe and economical construction. Covers walls of all kinds. *National Builder*, 6-22, 2000 w. CS.

Design Features of Lincoln Highway "Ideal Section." Covers committee discussion of "Ideal Section." Eighteen principal points covered: width of right-of-way, pavement width, loadings, drainage, type of pavement, use tie steel, earth shoulders, lighting, curves, foot path, guard rails, crossings, wiring, advertising signs, obstructions to vision, markings, maintenance, comfort stations. W. G. THOMPSON, *Eng. News-Record*, 6-15-22, 6000 w. CS.

Painter's Judgment and the Building Manager's Specifications. Part III. Covers specifications for interior painting of office building. FRANK G. BREYER, *Bldgs. & Bldg. Management*, 6-12-22, 3500 w. CS.

About Highway Construction. Discussion on salaries for highway engineers, what has been done by various States on maintenance and construction of highways, and the need of new highways. A. R. HIRST, *Highway Engineer & Contractor*, 6-22, 1500 w. CS.

Field Check in Formulas for Earth Pressure. Results of measurements made to obtain information as to intensity and distribution of pressure exerted by saturated bank against vertical wall and especially what reduction in pressure would result from drainage under sheetpiles. H. S. SCHICK, *Eng. News-Record*, 6-15-22, 2500 w. CS.



(Magazine of Wall Street)

Development in Method of Constructing Brick Pavements. Discussion of various types of brick and joint fillers. Recommends use lug brick with joints filled with asphalt cement. ARTHUR H. BLANCHARD, *Highway Engineer & Contractor*, 6-22, 1000 w. CS.

New Phase of the Shear Problem in Beams. Discussion of shear in beams, aiming to differentiate between end anchorage of rods that is thoroughly good and that which is "almost good." *Concrete*, 6-22, 1500 w. CS.

I-Beam Chart. Chart with graphic determination of safe load for a given span of I-beam of known weight and depth. Useful for engineering work. W. F. SCHAPHORST, *Iron Age*, 6-8-22, 350 w. APS.

Fireproof Qualities of Pressed Steel Construction. Analysis of pressed steel type of fireproof construction reveals following: Load carrying members are units composed of pressed steel joists made of highest grade and thoroughly worked steel similar to structural steel. These joists are covered with 2-in. concrete, and protected on under side with metal lath and plaster. This construction has satisfactorily passed several fire tests. A. H. BROMLEY, *Eng. World*, 6-22, 1500 w. CS.

Testing Caisson Foundations. Description of tests made on the site of the proposed Union Station in Chicago. The first time that such tests have been made. Full size concrete piers 65 feet deep were tested by loading and their carrying power was ascertained. The unique tests and the original method for applying the load are fully described. *American Architect*, 5-24-22, 1000 w. EMcC.

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The Flapper's Influence on Trade

WILL there be "flappers" this fall? This question is being anxiously discussed in the clothing, millinery and hosiery trades. For not only does the presence of the "flapper" mean a demand for novelties, but an increase in the consumption of woolen apparel of all kinds. Last winter the cheap woolen "flapper" coat competed so successfully with fur that prices of fur coats were forced down considerably. In many quarters it is believed that this rivalry may continue during the coming winter. Recent developments in the woolen yarn market, for example, seem to indicate a belief that the "flapper" will remain for some time to come.

Although worsted yarns are quoted in the local market at the same figure that ruled last week, prices for both weaving and knitting yarns are reported to be firm, and it is said that spinners are reluctant about booking much new business at current price levels. Yarn prices, according to authorities in the trade, are more likely too advance than to decline, and spinners are cautious in engaging for future deliveries.

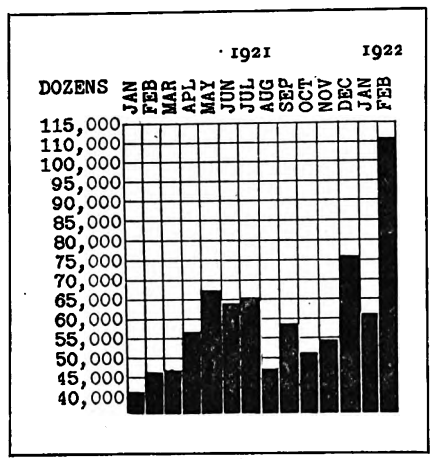
Progress in Artificial Silk. Until present time artificial silk has only been produced of a count varying from eight to ten deniers, while double thread of silkworm is of two to three deniers. Complaint among consumers of artificial silk thread has been inability of manufacturers to place thread of fineness of natural silk on market. This need recently supplied by French inventor. By new method, same size of apertures may still be used and same maximum spinning speed of 45 metres per minute may be continued. Two factors of this improvement are: feed of viscose to each aperture in relation to unit of time and minimum percentage of acid in spinning bath. *Silk,* 5-22, 2200 w. HHH.

Artificial Silk Hosiery. Machinery and methods of manufacturing artificial silk hosiery. WILLIAM DAVIS, *Textile American,* 4-22, 3000 w. WRR.

Wet Cleaning and Bleaching. Continued article, first part considering equipment. Tubs may be of stationary type, of wood, cement or enameled iron. Three or four galvanized iron tubs of different sizes are always handy. Also need buckets, gallon-size enamelware or earthenware vessels, dippers and barrel for melted soap. Scouring table also essential, marble making best top, hardwood being next. Brushes are principal "tools" used by wet cleaner. Care should be used to secure proper kinds, as some may injure fabrics. Other equipment discussed include washer, extractor drying tumbler and steam board. ROY DENNEY, *National Cleaner and Dyer,* 5-22, 2400 w. CJW.

Shaded Goods. Among defects caused in finished fabric by scouring and steaming are what are known to trade as "shaded pieces." If this is caused by steaming, it is because piece receives more severe steaming in one part than another. Darker shade in that part receiving more severe steaming. May be caused by improper scouring, as when pieces are scoured too hot, or with too much alkali and this is not properly washed out. May, however, come from dyeing, due to fluctuating steam pressure, bringing pieces to boil too quickly, shading up with concentrated dyestuffs, etc. T. J. BIERY, *Am. Dyestuff Reporter,* 5-8-22, 750 w. CJW.

Making Embroideries and Venise Laces. Embroideries and venise laces made on so-called schiffle embroidery machine. Embroideries stitched on respective cloth on which they are sold, venise laces stitched on silk cloth. Stitched cloth eventually dipped into chemical solution which burns out silk and leaves stitched design untouched. For this reason, venise laces also called burnt out laces. After designs for embroideries and laces are made next step is enlarging patterns or making cartons. On these cartons is indicated every stitch which machine will be required to make in order to reproduce design on cloth. Enlarged design on carton six times that of original sketch. *Lace and Embroidery R.,* 5-22, 1800 w. HHH.



Exports of artificial silk hosiery from Jan. 1, 1921, to Mar. 1, 1922.—*(Underwear and Hosiery Review.)*

Rugs of Alpujarras. Rugs of Alpujarras, Spain, interesting both in process and design. Made of wool or silk, but basic fabric on which colored pattern is worked is hand-woven linen. Wool woven on this by passing strands through and under various threads of fabric. In some cases pattern has strong mosaic, angular and blocky in character; in others lines are freer and pattern is not so much controlled by weave of basic fabric. Evidence of strong Moorish influence in character of designs. W. W. KENT, *American Carpet and Upholstery R.,* 5-22, 2000 w. HHH.

When Should Retail Clothiers Advertise. Effective advertising campaign largely dependent upon when various articles are advertised. Higher-priced merchandise should be advertised early in week, popular price goods toward end of week. Advertisements should conform to seasons. Feminine influence should be considered in planning Sunday advertisements. Sunday ads should follow up Saturday night display. *National Retail Clothier,* 5-22-2000 w. HHH.

How to Build Store That Sells. Building should be constructed with view to convenience for salesmen and trade. Use of glass showcases more advisable than shelves. All incoming merchandise should be carefully checked and marked in special department before being placed on sale. Surplus goods should be stored in wooden cases constructed to prevent damage by either dusts or moths. Store should be able to supply its own electricity in event of damage to regular lighting system. Display and stock cases should be prominently placed, but so arranged that broad aisles are possible throughout store. *National Retail Clothier,* 5-22, 2200 w. HHH.

Asbestos suits are made for persons engaged in work that requires fireproof clothing. Asbestos can be spun so fine that 100 yards of the filament will weigh only one ounce and cloth can be made from this weighing only a few ounces to the square yard.—*Steam Shovel and Dredge Mag.*

Card Clothing and Grinding. Carding is the chief state of cleaning wherein the minutest impurities ought to be removed. Faulty carding affects detrimentally all that follows after it. W. R. HEWSON, *Textiles,* 5-22, 900 w. MBB.

A paper tape measure is being rolled into German bolts of cloth. This permits the salesmen to tell at a glance the measure of cloth remaining in the bolt, thus economizing labor and time. The tape is marked off in yards and meters—*Steam Shovel and Dredge Mag.*

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Furfural from Corn Cobs

THE production of the new furfural chemical compound promises to have a far-reaching effect upon industry, says the *Chemical Color and Oil Record.* Dr. Frederick B. La Farge and Gerald H. Mains, of the Bureau of Chemistry, are credited with having perfected methods for producing this compound from corn cobs. The most important results of the perfection of this process are that it will make possible the production of low-priced substitutes for a wide variety of hard rubber and synthetic resin products; provide a good market for waste farm by-products; conserve the native supply of methanol (wood alcohol) and the forest products, particularly hardwoods, used in the manufacture of methanol; and provide a possible motor fuel supply.

Furfural, under the La Farge process, can be produced commercially for about 6 cents per pound, and with the development of the by-products, also obtained from corn cobs, it is believed that it may be produced even more cheaply. Among the available by-products are acetic acid and a gummy material which has a field of usefulness in the manufacture of coal briquettes.

Magnesium. Raw materials for manufacture of metallic magnesium are magnesite (carbonate) and magnesium chloride. Three processes proposed: Thermal, substitution and direct electrolytic. Practically all magnesium produced by electrolysis of chloride in state of fusion with or without admixture of sodium and potassium chlorides. Two processes for producing anhydrous magnesium chloride: action of chlorine on magnesium oxide and removal of water from chloride crystals. One process consists in drying in dry air at 150° for several hours and then exposing to current of dry hydrochloric acid at 300°C. Fusion point lowered by addition of other chloride and electrolysis carried out in two steps. Alloy of lead first formed. Chlorine disposed of by passing through towers containing milk of magnesia. Process consists of complete cycle and really consists in separation of magnesium and oxygen, in that, apart from production of byproduct potassium chloride, only raw material is magnesite. S. T. ALLEN, *Chem. Met. Eng.,* 5-24-22, 1500 w. CJW.

Sulfuric Acid. Description of contact plant built for U. S. at explosive plant C., Nitro, W. Va. Plan showed in 2 flow sheet. Contact mass calcined magnesium sulfate impregnated with platinic chloride, so that it contains 0.15% to 0.30% of catalyst. Combustion gases entering converter contain about 5.5% sulfur dioxide, balance consisting of oxygen and nitrogen. Conversion chart for determining percentage conversion of sulfur dioxide to trioxide from percentages of dioxide in entrance and exit gases and chart showing relation between strength of sulfuric acid and rise in temperature on dilution with water given. M. F. CHASE and F. E. PIERCE, *J. Ind. Eng. Chem.,* 6-22, 2500 w. CJW.

A powdered chemical compound is said to thaw frozen pipes more quickly than a blow torch. The powder, on being mixed with water, will generate a high degree of heat. The mixture is poured into the open end of the frozen pipe, and on meeting the obstruction will remove it by the heat, bubbling of gases, and the nature of the chemicals.—*Steam Shovel and Dredge Mag.*

Ammonium Nitrate. Description of modern practice and consideration affecting design and operation of ammonia stills, scrubbers, condensers, neutralizing tubs, evaporators and crystallizing kettles. If tar and sulphur content of ammonia liquor is as low as 0.01% and 0.05% can be neutralized directly with dilute nitric acid. Otherwise must be distilled. Product used in explosives, effecting considerable saving in cost and rendering explosive more suitable for many operations by reducing velocity of detonation to marked degree but increasing "heaving" effect, performing more useful work per pound of explosive. E. M. SYMMES, *Chem. Met. Eng.,* 6-7-22, 3500 w. CJW.

Phosphoric Acid. Study has been made of suitable methods for determining inorganic constituents of commercial phosphoric acid, which are given in outline. Tabulated results are given showing composition of different samples of phosphoric acid prepared from bones and from phosphate rock by sulfuric acid method and from phosphate rock by volatilization method. Volatilized acids are relatively low in such non-volatile constituents as calcium, iron, aluminum and manganese. Presence of other elements such as lead, sulfur, chlorine, and fluorine in unrefined acids depends more on contamination and on composition of rock or bones from which they are obtained than on process used in their preparation. Lowest proportion of inorganic constituents in samples analyzed was found in volatilized acid that had been collected in Cottrell precipitator and commercially refined. W. H. Ross, C. B. DURGIN, and R. M. JONES, *J. Ind. Eng. Chem.,* 6-22, 5000 w. CJW.

Muscle Shoals and Nitrogen Supply. Nitrogen essential constituent of practically all explosives, and essential to all vegetable and animal life and required in number of important industries. Usually obtained in form of proteins, ammonia, nitrates or cyanides. Discussion of three processes for fixing nitrogen, arc, cyanamide and synthetic or Haber. At Muscle Shoals cyanamide process selected because of its dependability. General conditions of plant outlined, including power and raw material requirements and convenience with which these requirements can be supplied. Chemical reactions developed. Future of nitrogen fixation in U. S. will depend on relation between demand and supply of inorganic nitrogen. Estimated that total consumption in 1924 will be 294,500 tons, and 438,000 tons in 1930. Estimated domestic supply of by-product nitrogen estimated at 122,500 and 159,500 tons, respectively. Balance must be supplied by nitrogen-fixing plants. J. K. CLEMENT, *Chem. Age,* 5-22, 2500 w. CJW.

Indigo. General article on chemical and physical characteristics of indigo, extracts and modifications of same. Purpuric acid, or red extract of indigo, particularly mentioned. Commercial varieties of vary greatly in actual content of indigotin. Worst qualities are those of light blue color, approaching gray or green. Water should not exceed 6%. Ash should be less than 10%. Real indigo blue determined by titration with potassium permanganate. Various dye baths discussed. W. B. NANSON, *Cotton,* 5-22, 3000 w. CJW.

Testing Dyes. Every lot of color should conform with recognized standard in strength, shade, tone, and other properties before delivery to user. Apparatus required for testing is enumerated. Two or three samples should be taken from different parts of lot and mixed. The material is weighted, made up to volume and various fabrics dyed and the products examined. Detailed directions for acid and chrome colors. E. GREENHALGH, *Am. Dyestuff Reporter,* 5-22-22, 1600 w. CJW.

Light Fastness of Dyestuffs. Outline of process based on discovery that dyes in solution are reduced in color value much more rapidly thanon fabric, spectrophotometric analysis making possible study and detection of minute color changes, fact that different concentrations of dye have varying degree of perceptible color change, when faded; improved methods of regulating selectivity of wave-constituents of transmitted light (artificial daylight) and discovery of qualitative relation between absolute fastness and dyed fastness. H. S. BUSBY, *Textile Colorist,* 6-22, 1200 w. CJW.

Mordants and Mordanting. Chloride of lime is used to bleach vegetable fibres, and as discharge in printing calico; prepared by passing chlorine gas over thin layers of calcium hydreate, chlorine being absorbed, and desired article results. Ammonium chloride is employed in fixing aluminate of soda in cotton, and in dyeing aniline black. Magnesium chloride, very soluble substance, employed as addition to size for cotton warps. Alu-

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minum chloride is used in carbonization vegetable matter mechanically entangled in wool, is not considered equal to magnesium chloride for this. Stannous chloride may be used in small quantities in clearing bath in Turkey-red dyeing, when used with alizarin red produces orange shade on wool. Calcium has tendency produce unevenness of shade. Advises against boiling wool in mordant bath. JAMES STEELMAN, *Textile Colorist*, 5-22, 3000 w. MBB.

Textile Soaps. Soap from straight pure oleic acid (red oil) or from olive oil is best for textile purposes. Tallow and silicate are injurious adulterants, added to cause soaps to harden more readily. Melting point of fatty acid from soap will detect adulteration with tallow. Method of manufacture discussed in popular manner. Silk industry must use neutral soap, as should wool-scouring and -fulling soaps. Cotton may be treated with alkaline soaps. J. A. BRANEGAN, *Cotton*, 5-22, 1500 w. CJW.

Topping. Topping used to secured brilliance of basic dye. Suggestions are made for correcting redness in blacks by topping with methylene blue 2B, aniline black or sulphur dyes may be topped with basic dyes, such as methylene blue or methylene violet. Logwood and other natural dyestuffs may also be followed by basic color. Other processes include topping sulphur black on fiber with aniline oil, aniline black or manganese bronze with indigo, etc. Formulas are given. GEORGE EMMONS, *Textile Colorist*, 6-22, 1500 w. CJW.

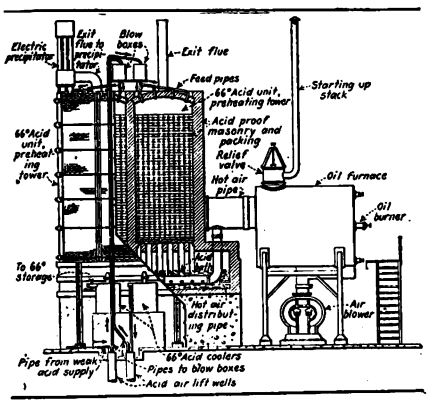
Mordanting Wool for Hematine. Hematine is sensitive to oxidation by chromic acid and also sensitive to reduction by sulphurous acid. Reduced chrome mordant does not destroy hematin during dyeing and when fully basic gives much stronger dyeing than unreduced mordant. Also gives much superior fastness to light. Sodium bisulphate is cheapest reducer of chrome. Soda treatment still further improves strength. Lactic acid is an assistant which reduces chrome and exhausts bath at same time. Alkali other than soda ash may be used, ammonia or borax being just as effective. Recommended mordants are given. A. B. CRAVEN, *Am. Dyestuff Reporter*, 6-5-22, 2000 w. CJW.

After-chroming of Wool. Various dye and scouring tests make it evident that in after-chroming process results vary with different colors to greater or less degree with salt of chromium used. In main, all salts change the shade less from that obtained in simple acid dye than does the bichromate. The shades obtained with various salts resemble each other more than do those obtained with bichromate. Scouring tests with various salts show in general an improvement in fastness, especially that obtained with bichromate. Acetate, chlorilem fluoride, nitrate, oxalate and sulphate of chromium were studied. A. A. CLAFLIN, *Am. Dyestuff Reporter*, 6-5-22, 2000 w. CJW.

Throwing Power and Current Efficiency of Zinc Plating Solutions. Compares various types of plating solutions. Greatest throwing power with alkaline cyanide bath and with insoluble anode in parallel with zinc anode bath gives constant conditions for weeks by replenishing from time to time with small amounts of addition agents. W. GRENVILLE HORSCH and TYLER FUWA, *Brass World*, 5-22, 6000 w. APS.

Unusual Alkaloidal Precipitant. It has been observed that potassium citrate in 5% solution is a general precipitant for alkaloidal solutions. W. G. TOPLIS. *J. Am. Pharm. Assoc.*, 5-22, 1000 w. CJW.

Electrical Precipitation in Wood-Distillation. Although small-scale experiments have not removed last trace of pitch and although satisfactory acetate of lime could not be made from directly pyroligneous acid, yet experiments have shown that general idea of precipitating tar from hot vapor is possibility. Furthermore, there is still no reason to believe that in commercial scale apparatus formation of secondary tar may not be more complete before vapors leave retort and that purer pyroligneous acid might not, therefore, be obtained by this method. L. F. HAWLEY and H. M. PIER, *Chem. Met. Eng.*, 5-31-22, 1800 w. CJW.



Hot air-submergence type unit for concentrating sludge acid from oil refining. See "Concentrating Sulphuric Acid" digest below.

Concentrating Sulphuric Acid. Four principal methods are: Cascade, tower system, combination surface evaporation and tower concentration and hot-air submergence type. Description of various types of apparatus, with special reference to the use of the last named in recovery of sludge acid. Cost estimated to be about half of that by older method. Operation carried out in two stages to avoid foaming due to decomposition of hydrocarbons. In first stage acid is concentrated to 50-55° Baumé, or just below point at which foaming commences. Hydrocarbons are broken down and volatilized by stream of air passing through acid. In second stage acid is concentrated to 66° B, finished product coming out concentrator at about 110° F below its actual boiling point. Two units of similar construction. (See illustration.) P. S. GILCHRIST, *Chem. Met. Eng.*, 6-21-22, 2500 w. CJW.

Elimination of Industrial Odors. Method has been developed for elimination of industrial organic odors by admixture of gaseous emanation with very small quantities of chlorine gas. Since total amount of odoriferous substance involved, even when strong and exceedingly offensive odor is distributed over many square miles, is very small in absolute amount, it is necessary to use only correspondingly small amounts of deodorant agent. For best result amount of chlorine must be adjusted with considerable quantitative accuracy. Use of chlorine has advantage that it is already in use for control of city water supplies and apparatus for control and precise adjustment of flow of gas in manufactured and already widely used. Method makes possible great economy in disposal of garbage of large city. All that is necessary is simple drying plant in each division of municipal area, rendered inoffensive by chlorination of effluent vapor. Dried material may then be collected in central plant for extraction of grease or other treatment. Y. HENDERSON and H. W. HAGGARD, *J. Ind. Eng. Chem.*, 6-22, 4000 w. CJW.

Business Side of Chemistry. General discussion of sales research or sales engineering. Problem to find uses or new uses for product or to develop prospects who would be interested in product. Need technical training in their solution. Good credit man will indicate desirable customers so that sales department can turn its sales effort to best advantage. Sources of credit information, terms of sale, trade acceptance. Traffic department concerned with cheapest way of routing material, locating and tracing shipments and collecting claims against railroads. Collections. Sales service or trouble department. CHARLES WADSWORTH, *Chem. Met. Eng.*, 6-7-22, 3500 w. CJW.

Intermountain Chemical Industry. Importation of certain heavy chemicals into Utah has been tabulated. Impossibility of establishing general chemical industry is pointed out. Might be opening for small industrial distillery, hydrochloric acid plant, sodium chemicals and glass and paper industries. W. D. BONNER, *Salt Lake Mining Rev.*, 5-15-22, 2500 w. CJW.

Fire Hazards in Chemical Plants. Following classification and number of causes is discussed and examples given of 473 fires which should be studied by everyone working in chemical plants: Special Hazard Causes — Ignition of chemical, 38; explosion of chemical, 33; overflow or boiling over of chemical, 31; spontaneous ignition of chemical, 30; foreign substance in grinding mill, 24; ignition of inflammable vapor, 20; drying room, 16; explosion of apparatus, 16; overheating of kettle or oven, 14; sparks ignite chemical, 13; spilling of acid or ether, 8; ignition of oil, 7; ignition of gas, 5; ventilating fan, 4; miscellaneous special hazard causes, 19. Common Causes—Heating, 22; matches—smoking, 16; power, 14; lighting, 13; spontaneous ignition, 12; sparks from locomotive, 8; exposure, 7; defective electric wiring, 6; incendiary, 5; defective flues, 4; lightning, 3; miscellaneous common causes, 3. *Chem. Age*, 4-22, 1000 w. CJW.

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ELECTRICITY

Boom Days Ahead for Hydro-Electric Power

THE present hydro-electric development of the country will be doubled if all the proposed 300 projects for which applications have been made to the federal power commission become available. These projects would add 20,000,000 hp. About one-quarter of the applications have been acted on by permit or license, representing 3,333,000 hp. for the installations approved. At an average cost of $200 per horsepower, this would represent an ultimate expenditure of $4,000,000,000 or an immediate expenditure of $700,000,000.

Power points out that this development will result in important gains to the electrical industry. Not only will it benefit the makers of such equipment as enters into hydraulic plants and systems, but will increase the demand for competent engineers. The encouragement of federal supervision is being afforded impartially in all cases, whether they are small irrigation projects, or more important developments, such as that on the Boulder canyon of the Colorado river, or the Utah power and light development proposed for the Green river. It is believed the country will gain greatly by insistence upon sound engineering and financial conditions

Two-Stage Current Transformer. Brief discussion of the current transformer as used with measuring and controlling apparatus with special refrence to the degree of accuracy which can be attained in the ratio and the phase angle. New type of current transformer is described in which it is possible to secure much higher accuracy with a given amount of copper and iron in the transformer. In new device the transformation is effected in two stages, the first yielding in the usual way a secondary current which is approximately correct in magnitude and phase, and the second yielding an auxiliary corrective current, which when combined with the first secondary current, gives a resulting current which very closely approximates the secondary current which would be furnished by an ideal current transformer having no errors. The two currents can be easily combined by having two like windings in the devices operated, one for the main and one for the auxiliary secondary current. The mathematical theory is developed and experimental curves are given to compare the performance of the new transformer with that of an ordinary simple current transformer of good average performance. H. B. BROOKS and F. C. HOLTZ, *J. Am. Inst. Elect. Engrs.*, 6-22, 7000 w. IG.

Parallel Operation of Commutating Pole Motors and Generators. Discussion of various conditions under which commutating pole motors are operated in parallel. Characteristics of machines, and division of load between generators are described. Vector diagrams are drawn. C. B. HATHAWAY, *Electric J.*, 6-22, 5000 w. IG.

Baltimore Oil Circuit Breaker Tests. Tests of large oil circuit breakers were made to determine the adequacy of oil circuit breakers for increased duty. Tests were made on 13,000 volts, 25-cycle power system. Largest generating capacity on tests amounts to 170,000 kw. Current obtained varied from 750 to 23,700 ruptured r.m.s. arc amperes. All tests were made by throwing three-phase metallic short circuits directly on the system which the breaker under test was called upon to clear immediately. Three oscillographs were utilized to record the sequence of events. Total of 200 short circuits was made directly on the Baltimore system without any breakdown whatever of the major equipment of the two operating companies, and in all cases without causing any more than a momentary disturbance in the voltage in the system. Results indicate that it is possible with proper design to build oil circuit breakers which can be relied upon to satisfactorily interrupt large currents on high capacity systems many times in succession without damage to the breakers, without oil throw and without change of oil or adjustments. H. C. LOUIS and A. F. BANG, *J. Am. Inst. Elect. Engrs.*, 6-22, 6000 w. IG.

Economy in Central Stations Regarding Heat Equivalents. How heat and power are economized in central stations. Coal and power are synonymous and it is as necessary to watch one as the other. N. HARRISON, *Central Station*, 6-22, 4500 w. IG.

Determination of Motor Drive Power Requirements. Methods and apparatus for determination of motor drive power requirements of various machines. T. CROFT, *Electrical South*, 6-22, 5000 w. IG.

Small Current Consumers of Central Station Power. Use of power for various small installations. The relations of the power plant to these small consumers, etc., are discussed in general. N. HARRISON, *Central Station*, 5-22, 4000 w. IG.

Selection of Auxiliaries for Hydro-Electric Power Stations. Author tells of what auxiliaries consist, and then discusses each and its proper selection. He takes up central versus individual pumping systems for governor fluid, water versus oil for governor fluid, lubrication systems for waterwheel bearings, separate small waterwheels for auxiliary power supply, and other similar topics. F. H. ROGERS, *Power*, 5-16-22, 2700 w. MAH.

Dielectric Losses and Stresses in Relation to Cable Failures. Excluding cable failures due to lightning, external damage to the lead sheath and joint troubles, remaining transmission cable failures have been largely dielectric loss failures. Cables loaded with more current than they bear. Temperature readings should be made in conduits to indicate conditions that must be withstood by the insulation on the cables. D. W. ROPER, *J. Am. Inst. Elect. Engrs.*, 6-22, 6000 w. IG.

Pole and Cross-Arm Preservation. Length of life of telephone varies with kinds of wood used, sizes of poles and service conditions. Decay of wood is result of fungi forms of plant life. Requirements for fungi growth are food, moisture and air. Poles set in gravel and broken stone are less likely to decay than those set in loam because they are likely to have a lower moisture content. Temperature is also important in fungi growth. Most favorable temperature varies from 60° to 90° F. It is not feasible to control the air supply nor the temperature and moisture. The food supply remains. Antiseptic agency used to poison the food supply so that fungi cannot live on it and die. Such an agent must be capable of being injected into the wood without being detrimental to the structure of the wood itself; it must not be poisonous to man and animals. It is also advisable to use a chemical which is insoluble in water. Coal tar products obtained from the distillation of coal tar are the best preservative met with in general practice. Wood should be dried before being treated as it absorbs more of the preservative in the dry condition. Costs of the brushing method of treatment are given. Dipping treatment ensures better penetration of the preservative into the wood. Other methods are also described as well as the process used in the impregnation of cross arms. Poles already in place can also be given a treatment with the coal tar preservative. E. E. KING, *Telephony*, 5-13-22, 6000 w. IG.

Magnetic Clutches in the Cement Industry. These devices are used to transmit up to 600 to 800 HP. Torque requirements are discussed, and operation of magnetic clutch in tube mill is described. Magnetic clutches possess advantage over other types because force required for operation is developed within clutch structure itself in place of being transmitted from outside source by means of sliding collars. toggles, etc. Simplicity of mechanism is one of main characteristics of magnetic clutch. Highly desirable to use clutch which may be operated simply by closing switch, as contrasted with mechanical clutch which may require one or several men to engage it. W. H. COSTELLO, *Cement, Mill and Quarry*, 6-5-22. 2000 w. IG.

Application of Relays. Detailed discussion of operation of relays; Vector analysis is used. L. A. TERVEN, *Electric J.*, 6-22, 5000 w. IG.

Highway Lighting a Factor in National Development. This article is in the sense of a message to the electric lighting industry of the country. The need for adequate service to the farmer is emphasized. Importance of good highways is indicated. Proper lighting of these highways is shown to be an important factor in the development of industry and in getting produce to market from the farm and in the inter-urban movement of merchandise by motor trucks. R. TRAUTSCHOLD, *Central Station*, 5-22, 6000 w. IG.

Residence Lighting. Importance of proper lighting of residences is emphasized. Three systems are in general use, that is, by direct, or semi-indirect or totally indirect illumination. Lighting of each room in house is described. A. L. POWELL and H. A. SMITH, *Electrical South*, 6-22, 8000 w. IG.

Electricity in the House. Sixth of series of articles, this one dealing with cellar of modern house. Writer shows it to be sensible and economical to pay as much attention to wiring of cellars as to wiring other rooms. M. O. WHITTON, *Amer. Architect*, 6-7-22, 1600 w. E. McC.

A monster searchlight will now illumine the skies ten miles above the earth. This light may be used as an airplane guide at night and also for advertising purposes. Letters of light on the clouds—what a possibility for an advertising agency!—*Steam Shovel and Dredge Mag.*

R. R. Telegraph and Telephone Practice. In this article the effects of resistance, inductance and capacity on line circuits and in cables are discussed. B. STANLEY RHOADS, *Railway Signal Eng.*, 5-22, 6000 w. I.G.

Application of Telephone Repeater. Description of technical difficulties that are in way of general application of telephone repeater. Need for large amount of auxiliary apparatus is emphasized. Various examples of interesting uses of telephone receiver are cited. H. S. OSBORN, *Telephony*, 6-3-22, 5000 w. IG.

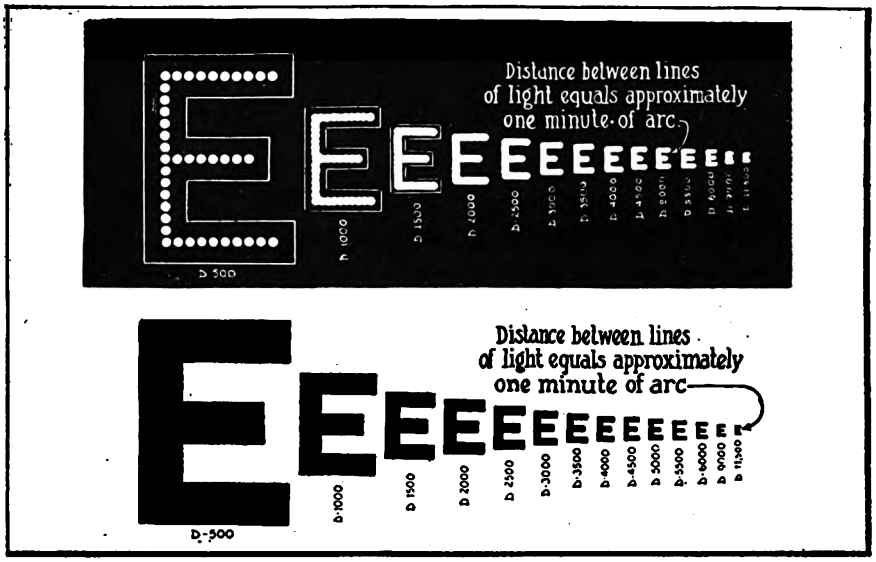
Analogies Between Telephone and Animal Ear and Vocal Organs. An interesting discussion showing relation between ear and vocal organs and telephone. It is indicated that the hearing and speaking functions of the telephone are inseparable. Comparison of telephone and ear alone is incomplete. Such comparison is perfect only when vocal or sound producing organs, as associated with the ear, are included in discussion. T. W. LOCKWOOD, *Telegraph and Telephone Age*, 5-16-22, 2500 w. IG.

Minimum Stress Theory of Cable Breakdowns. It is proven that the maximum stress theory is incorrect. D. W. SIMONS, *J. Am. Inst. Elect. Engrs.*, 6-22, 6000 w. IG.

Simple Home Made Radio Receiving Set. Instructions in detail relative to the making of the various parts of a radio receiving set and manner of installing them. *Radio*, 5-22, 6500 w. IG.

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Effect of irradiation in reducing legibility of high-wattage electric signs on clear nights. The upper series of letters shows the appearance of an illuminated electric sign letter of various distances (H = 10 ft., fifteen 75-watt clear lamps in vertical stroke). The lower series shows the same letters as seen by daylight when the effect of irradiation is negligible. At 5000 ft. for the lighted letter and at 11,500 ft. for the daylight letter, the space between the strokes is about one minute of arc and the letter is at the limit of legibility. The true effect from the illustration can be best obtained by holding the page at such a distance that the smallest E in the lower row is legible.—*(McGraw-Hill Industrial Letter.)*

Radio Installation Rule Division. A number of tentative rules for the installation of radio equipment as devised by the special committee of the National Fire Protection Association. *Telephony*, 6-3-22, 2500 w. IG.

Practical Device for Radio Reception. Description of a vacuum tube device which does not require a storage battery but which will give comparable results for radio reception. *Electrical South*, 4-22, 2000 w. IG.

Radio Limited. Description of special train equipped with radio sending and receiving apparatus, both telephone and telegraph. J. J. GRAF, *Railway Signal Eng.*, 5-22, 2000 w. IG.

A radio telephone at each of the 70 tables of a San Francisco hotel enables the diners to listen to one of several concerts that are broadcast daily. Diners now eat while listening and the hotels of the city are making preparations to have wireless phones installed in their guest rooms.

Braking with Direct Current Motors. Direct-current motors may be made to develop braking action under two conditions—one when load drives armature above normal speed; second, when motor is disconnected from line and its armature circuit is closed through resistance. First is called regenerative braking and latter dynamic braking. Article describes how actions take place and how they are applied to operation of direct-current elevator motors. B. A. BRIGGS, *Power*, 6-13-22, 1000 w. CJW.

Electrification of Steel Mills. The general effect on the operations, the advantages of central power plants are discussed. The effect on production was shown to be very advantageous; in some cases the increased output of the mills has amounted to 5% to 10% when electricity was used to drive them. Motors are very effective in driving reserving mills. Operating labor cost is less. Maintenance and repairs are less. W. SYKES, *Iron Age*, 6-1-22. 4500 w. IG.

Electrodes. Outline of process of manufacture of continuous electrodes at furnace. Various installations described. Advantages over carbon electrodes are: Reduced cost, cost of special mounting and protecting against air corrosion avoided, baking done without cost (by waste heat), electrode consumption is reduced, running of furnace is more regular, individual plants independent of electrode factories, number of laborers can generally be reduced and working conditions improved, and possible to make new furnace construction, which opens up possibilities for further development in smelting industry. C. W. SODERBERG and M. SEM, *Chem. Met. Eng.*, 6-21-22, 3000 w. CJW.

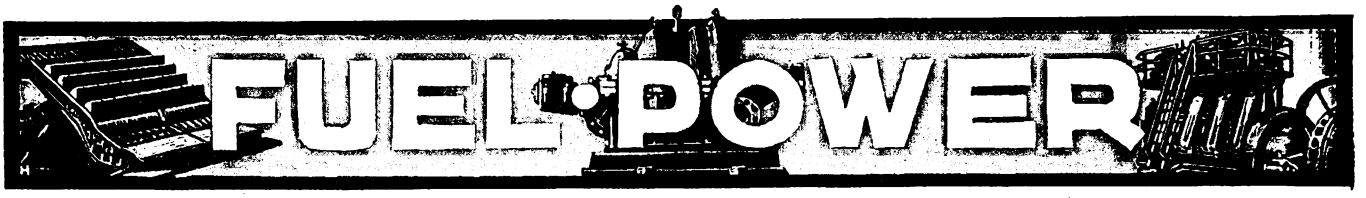
The telephone systems of the United States comprise 34,000,000 miles of wire. —*American Lumberman.*

Vulcanized Fiber. Discussion of various properties of hard or vulcanized fiber, as used for electrical insulation, including surface resistance, dieletric constant, resistance to heat, absorption of moisture, and resistance to moisture. RETZOW, *Paper Trade J.*, 5-25-22, 2500 w. CJW.

It is estimated that 19,000,000,000 telephone messages are transmitted annually in the United States.—*American Lumberman.*

Related Articles

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Heavy Imports of British Coal Doubtful

THAT the fuel shortage, in the event of a lengthy coal strike, will not be relieved to any great extent by British coal is evident when the cost of shipping it across the Atlantic is considered. British producers and shippers assert that unless all their coal can be brought over as ballast, it is useless to expect more than occasional shipments. The full cargo rate of $4 a ton on Welsh coal, and the charges for insurance, stevedoring, lightering, etc., added to the New Castle price of $4.83 would bring the cost of the British product to about $10 a ton, whereas the American price at Hampton Roads is only $6.10 to $6.50 a ton.

Referring to the cargo of bunker coal being brought to this country on the *Watsness*, a prominent exporter is quoted by the *Wall Street Journal* as saying that "recent fixtures at ballast rate cannot be taken as an indication that any great movement will go at this rate. As soon as orders materialize to an extent the necessity would force fixing a charter at regular full-cargo freight rates. The fixture of 8s 6d on the *Watsness* ballast cargo was made for the purpose of bringing the vessel to the United States at cost. Otherwise it would be forced to come with sand ballast, which would mean no return to the steamship company. Probable rate on fixtures in the future will be near $4 a ton."

It is pointed out that if the British price were to decrease $2 or more a ton, or if the American price were to go above $9 a ton, no doubt there would be a good market for British coal. The former, however, is regarded as impossible, and Secretary Hoover will prevent the latter if it is exorbitant.

Calls Present-day Waste of Coal in U. S. Criminal. About 95% of coal used is wasted so far as effective work is concerned. Average yearly coal bill in America amounts to $27 per person. Smoke costs untold millions annually. Railroad electrification would reduce fuel bill of transportation lines 64%. Gives facts regarding smoke menace to health, and statistics of smoke costs along various lines. *Bldgs. & Bldg. Management,* 5-1-22, 1200 w. CS.

Liquid Purification. Report of investigation of two systems: Seaboard, in which gas is washed by circulation of sodium carbonate solution and liquid fouled thereby revived by spraying down acidifying tower through which air is blown; and O'Neill, in which gas is washed by circulation of treated weak ammonia liquor and fouled liquor passed through treating tower or still for driving off contained hydrogen sulphide and carbon dioxide. Neither system has as yet proved to be very efficient as total sulphur removers, but both are very efficient cyanide removers. Both types claim very large sulphur absorption in their oxide boxes placed after liquid system. Results of test runs on each type. A. M. BEEBE, *Gas Age-Record,* 6-17-22, 1600 w. CJW.

Anthracite Briquetting in Canada. Near London, Ont., a company is successfully briquetting anthracite fines with crude oil residuum. Article describes the process, equipment, product, use of same, etc. Important point is cooling and hardening of briquettes, by means of a special device, and this is described in some detail; also illustrated. *Mechanical Engineering,* 5-22, 1350 w. MAH.

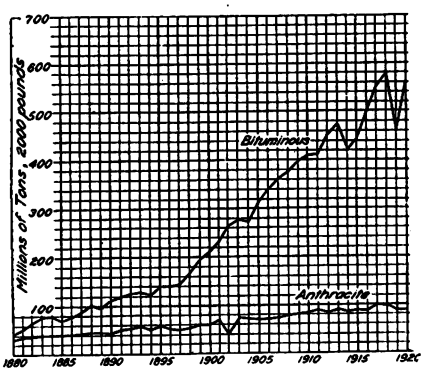
Bark as Fuel. Brief résumé of literature. Average bark from slasher and drum barkers (dry) has 8,660 BTU per lb. Various methods of drying bark are reported. E. R. SCHAFER, *Paper Trade J.,* 5-25-22, 1000 w. CJW.

Chloridizing Volatilization. Fuel consumption appears crucial point in commercial application of process. Depends chiefly on tonnage, draft and radiation. In its present form, Bureau of Mines process (Mining and Scientific Press, Aug. 27, 1921) will hardly compete with other processes except in localities where fuel is unusually cheap. Next problem consists in determining to what extent fuel consumption can be reduced by suitable modification of furnace. R. GAHL, *Eng. Min. J.-Press,* 6-3-22, 1200 w. CJW.

Fuel Oil Viscosimeters. Account of standardization and calabration of American-type of viscometer, known as Saybolt furol, and conversion tables for Saybolt furol, Admiralty and Universal instruments. W. H. HERSCHEL, *Chem. Met. Eng.,* 6-21-22, 1500 w. CJW.

Coal and Oil Burning Boilers. Results given show that in small plant producing about 4000 lb. steam per hr. for period of 10 hrs. daily, oil can be burned as economically as coal. If load fluctuation is considerable, there may be substantial saving by use of fuel oil. S. A. SMITH, *Power,* 6-13-22, 750 w. CJW.

Some Notes on Gas and Oil Turbines. Author tells why there are no commercial turbines despite a number of experimental forms. He claims the precooling used in many types is really a modification of the Otto cycle, and that it prevents success. Another point on which he lays considerable stress is that steam turbine has steady stream of fluid against blades, which in gas turbine there are long intervals between gas impulses against blades. This intermittent action he claims causes excessive wear of the blades, which means frequent overhauling and time lost, consequently failure. MAX SCHUELE, *Power House,* 5-5-22, 1560 w. MAH.



Growth of coal production since 1880.
—(Power Plant Engineering.)

Machine Firing Lowers Fuel and Labor Costs. Description of machine that mechanically and constantly feeds coal into fire boxes of either round or rectangular kilns at any rate desired and any quantity for each furnace for use in pottery or heavy clay products manufacture. *Brick and Clay Record,* 6-13-22, 1000 w. CS.

Steam Pipe Losses at High Temperatures. Besides describing recent experiments on losses from bare steam piping, author presents large chart for reading off losses directly, knowing length of exposed pipe, its size, gage of steam pressure, and its temperature. R. H. HEILMAN, *Power,* 5-16-22, 550 w. MAH.

New Method Proposed of Arriving at Heat Losses Due to Wind. Suggested method based on Weather Bureau records of wind velocities and directions during cold spells over period three years. H. M. HART, *Heating & Ventilating Mag.,* 6-22, 500 w. CS.

Steam Waste in Heating Railroad Coaches. Covers typical temperature regulation system, comparison of series and multiple arrangement of radiating pipes, economy of thermostatic regulation. T. W. REYNOLDS, *Heating & Ventilating Mag.,* 6-22, 3000 w. CS.

Sanitation, Heating and Lighting of Suburban and Country Houses. Part VII. Covers bathrooms: materials and fixtures. EDWARD E. ASHLEY, *National Builder,* 6-22, 2000 w. CS.

Refrigeration. Function of expansion valve is to pass ammonia at high pressure through small opening into low-pressure side of system, decreasing pressure from 125-175 lbs. to 15-25 lbs. Direct expansion and brine systems of cooling are briefly described and tables of salt solutions given. T. H. FENNER, *Power House,* 6-5-22, 1500 w. CJW.

Solving a Difficult Heating Problem. Account of improvements effected in steam producting plant of Transportation Building, Chicago. Has 40,000 feet single glass window area, is long, high, narrow structure with four sides fully exposed to elements. *Bldgs. & Bldg. Management,* 6-12-22, 2000 w. CS.

Centralized Combustion Control for Boilers. Instead of usual individual controls for each unit, New York firm has developed equipment for automatically controlling bank of boilers from single, small master controlled. Regulating system, which is described in detail in this article, is designed to maintain constant character of combustion at all loads on boilers. *Power,* 5-16-22, 2900 w. MAH.

Exhaust Energy in Reciprocating Engines. Surprising number of cases where oil, gas or steam engines will show better economy than purchased power and electric motors, and this may be emphasized where exhaust from steam engine is valuable for heating or process work. Up to now reciprocating engines have suffered from losses due to incomplete expansion. There has been compromise between such losses and mechanical ones connected with use of very large cylinders. Oil engines, multiple expansion and uniflow steam engines are coming to use high rates of expansion, and these are doing much to reduce exhaust losses. Many advantages may be gained, however, if energy remaining in exhaust at release can be converted into kinetic energy and from that into paryial vacuum in cylinder. Theoretical problems are presented and practical applications to either single- or multi-cylinder engines are suggested and illustrated. J. STUMPF and C. C. TRUMP, *Mech. Eng.*, 6-22, 2000 w. CJW.

Comparative Advantages of Unit and Line Drive in Industry. Installations in various industrial plants, such as paper mills, sugar refineries, mills are discussed. Individual conditions in each plant should be taken into consideration in determining whether machines should be driven by individual motors or from line shaft. Character of work, cost of installation and operation, and its bearing on production costs and effect on quality and quantity of output must be considered. Figures show comparative costs of two methods of driving machines. Each type has its advantages and is best used for certain purposes. Neither type superior in all cases. Advantage usually found in favor of group drive in connection with lighter machinery, such as in textile mills, canneries, can factories, etc. Paper making a problem in close speed control, and line shafts are often advantageous in paper mills. Individual drives are best suited for heavy work. H. P. PHILLIPS, JR., *Elect. and West. Ind.*, 6-1-22. 2500 w. IG.

Automatic Boiler Rooms. Customary operation of industrial plant's boiler room constitutes paradox. It is department subject to inflexible rules, commonly operated loosely and without exactness. It will continue to serve as an exceptional example of inefficiency until it is made automatic. Almost everything in boiler room is essentially automatic in nature and usually manual in practice. Automatic boiler rooms will sell power cheaply, at profit, to disgruntled operators of manual boiler rooms until this condition is corrected by education of industrial executives. *Industrial Power,* 6-22, 750 w. CJW.

After-cooling in Air Compression. Chief function of after-cooler is to remove moisture, which, if permitted to remain, ultimately reaches pneumatic tools and has harmful effects. Also liable to freeze in valve ports, etc., making tool sluggish in action and greatly retarding production. Use of after-cooler may actually increase power required to deliver foot of compressed air to tools, but over-all efficiency of tools, men and plant will be higher. Other advantages are that there will be less expansion and contraction of pipe lines, smaller pipe lines, reduction of expansion strains in pipe lines, removal of oil and tar from air and lessened risk of receiver explosions. P. A. BAUMEISTER, *Power,* 6-13-22, 1200 w. CJW.

Putting Steam Turbines in Service. Article actually refers to process of starting up, which is one always dreaded by engineer of very large units, and as this article is mainly about large units, this is logical. Turbines are referred to more than engines, although act of warming up and then cutting in tandem-compound unit consisting of high and low pressure cylinders in line and coupled up, is described. Types of turbines referred to are illustrated and described. *Power,* 5-16-22, 3400 w. MAH.

Refrigeration for Power Plant Engineer. General principles of the ammonia compression system are presented in this article, which is the third of a series. The properties which make ammonia a good refrigerating medium are explained, as are also carbon dioxide, and others. System is illustrated and described in some detail for power plant engineers. T. H. FENNER, *Power House,* 5-5-22, 4600 w. MAH.

Maintaining Heat Balance at Hell Gate. In this plant all auxiliaries are electrically driven by 60-cycle alternating current motors. What is referred to as heat balance is arrangement and control of apparatus in heat cycle to secure operations with least possible waste of heat. Incidentally possible disturbances and disturbing factors must be considered, as well as continuity, for nothing should be done in search for economy which might increase possibility of shutdown or make it more serious. From these view-points, all equipment and apparatus in this plant is considered. *Power,* 5-16-22, 3050 w. MAH.

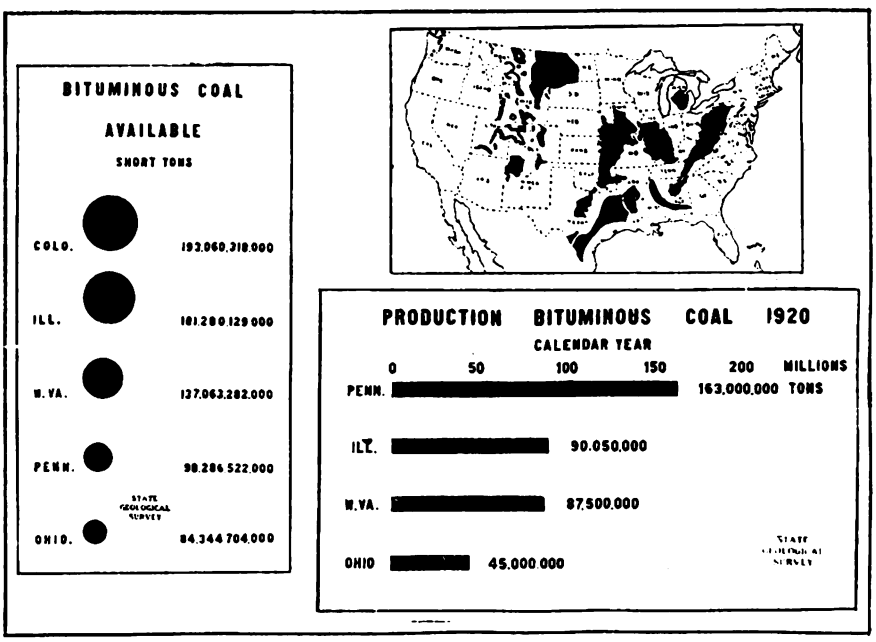
Value of Rope. Purchaser of rope is in need of education as to its possibilities. When rope once passes from warehouse of maker to custody of user, greatest abuse and most wasteful neglect seems often to be its portion. Reputation of rope-maker may be ruined through improper stowage and careless use. Endurance test should be uniform. Might use falling weight through determined distance. Should be tested both dry and wet. Tables should be tested for resistance against abrasion. Question of standard lay also important. FELIX RIESENBERG, *Cord Age,* 5-22, 800 w. CJW.

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Bituminous coal resources of five States; known coal areas of the United States; bituminous coal production of four States for 1920.—*(Power Plant Engineering.)*

IRON·STEEL

Iron Ore Prices

A REDUCTION in price of Lake Superior iron ores of 50 cents per ton is unfortunately without effect on pig iron prices, as an actual advance of several dollars per ton has been registered in the latter due to scarcity of coke on account of the coal strike. This decrease results partly from lower freight costs and partly from the light demand.

The most important ore from the tonnage standpoint is Mesabi non-bessemer. The season prices (f. o. b. Erie docks) have been:

1915....	$2.80 per ton	1919....	$5.55 per ton
1916....	3.55 " "	1920....	6.55 " "
1917....	5.05 " "	1921....	5.55 " "
1918....	5.05-5.75 per ton	1922....	5.05 " "

The price now developed is back to the 1917 basis and probably indicates lower prices on pig iron, which will, however, materialize only after the coal situation is adjusted and coke prices become normal.

Electric Cast Iron. History of electric cast iron, problems of cast iron, basic and acid bottoms in electric cast iron furnaces, given at Baltimore meeting of American Electrochemical Society. Great reduction in sulfur and improvement in castings. Complete tables of costs from German operating data. Electric pig iron from the ore. Four papers with discussions. *Iron Age,* 5-4-22, 4000 w. APS.

Electric Iron and Steel from Same Furnace. Alaska Treadwell Gold Mining Co. has been manufacturing electric iron castings since 1918. For perhaps seven months in the year, this company has surplus of electric power generated in its hydroelectric plants. When Connellsville coke is $8 at Atlantic Coast, it costs this company $48 delivered. Foundry pig is similarly expensive. As a result of these conditions—cheap electric power, high coke and pig costs—this company has been able to produce iron in the electric furnace from an all-machinery scrap without use of pig. It has found, too, that the same furnace could be used for making steel by simply alternating the two, the only necessity being that the furnace must be completely drained of iron. Details of process are given, especial attention being paid to many important departures from usual cupola practice. W. E. CAHILL, *Iron Age,* 5-11-22, 1900 w. MAH.

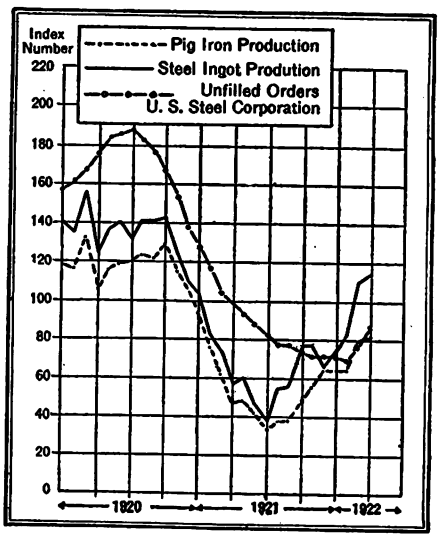
Control of Silicon in Blast Furnace. How composition of iron is regulated by varying composition in general of the charge and by controlling hearth temperature. Critical temperature for reduction of silica to silicon is 1450° C., which exists only in hearth. Large amount of slagging bases tends to prevent silicon forming. More silica in charge tends to result in more silicon in iron. Higher temperature in hearth leads to higher silicon in iron. S. L. GOODALE, *Blast Furnace & Steel Plant,* 5-22, 5000 w. APS.

Shaft and Open-Top Furnaces. Electric smelting of iron ore brings into consideration certain features of furnace design which are peculiarly applicable to this art. Discussion of two types, stack and open top. In former, variable operating conditions are caused by segregation and variable electrical conduction by irregular settlement of charge and after molten metal is tapped from furnace. Open-top furnace permits operation of be more closely controlled because variations in smelting rate show in conditions at top of charge. Stress is laid on advantage of placing charge just where it is wanted with assurance that it will not be segregated. Initial cost of construction is lowest and cost of maintenance is also lowest. R. C. GOSROW, *Trans. Am. Electrochem. Soc.,* 1922, 12 pp. *Chem. Met. Eng.,* 5-3-22. CJW.

Blast Meter in Foundry Practice. Necessity for measurement of air blast volume in cupola control with description of measuring instruments. LOUIS L. VAYDA, *Iron Age,* 6-8-22, 1200 w. APS.

Buckets and Skips for Blast Furnaces. Discussion of relative values of these two systems of filling. Reference made to actual plant practice in this country and abroad. Discussion. D. E. ROBERTS, *Iron Age,* 6-8-22, 3000 w. APS.

Economics of British Blast Furnace Practice. Presidential address before annual meeting of Iron and Steel Institute (London) took up possibility of relaxing chemical specifications if mechanical are met; the possibility of change in mixer practice to utilize a broader range of ores. Cost of modernizing an existing plant. British blast furnace capacity is 17,000,000 tons annually, restricted to 13,728,000 tons by blowing power, maximum output 10,260,315 tons in 1913; actual output 8,034,700 tons in 1920. Problems in improvement of old plant. Problems in ore supply and ore handling. *Iron Age,* 5-25-22, 4000 w. APS.



Iron and steel, as industrial barometer, show substantial and continued improvement. Indexes are based on a value of 100 for 1913.—*(System.)*

Metal for Cast-Iron Wheels. Three distinct compositions embodied in one mass: white, gray and mottled. Care necessary in blending cupola charges. Analysis of mixture. Features of pouring, annealing and cooling. Y. A. DYER, *Iron Age,* 6-1-22, 3500 w. APS.

Steel for Forge Welding. Method of manufacture, composition, fluxing quality, susceptibility to heat and welding temperature as they affect welding quality of steel. Average results of 80 tests on forge welds of hammer-welded pipe compared with original material. Steels not over 0.15 carbon and minimum tensile strength of 47,000 lbs. or not over 0.20 carbon and minimum tensile strength of 52,000 lbs. are satisfactory for forge welding pipe lines, penstocks, tank-car work, etc. Most important considerations for uniformly good work are suitable material, expert operators and facilities for control of operation. FRANK H. SPELLER, *Blast Furnace & Steel Plant,* 5-22, 2400 w. APS.

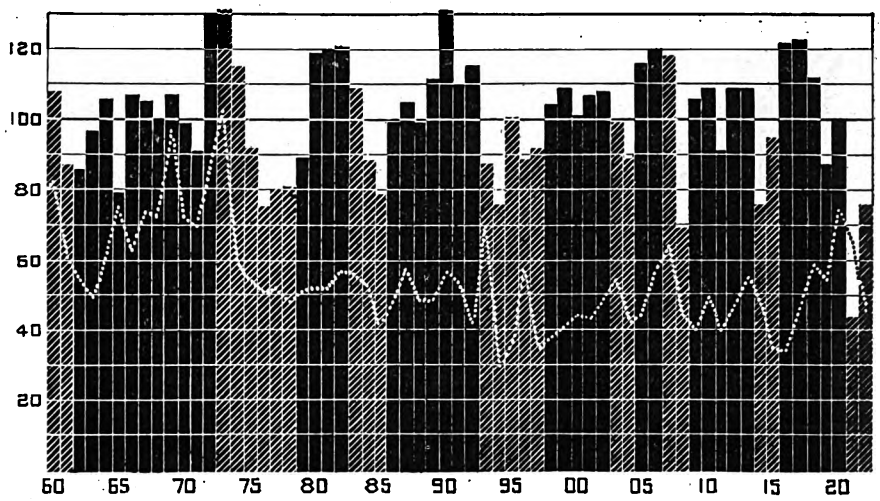
An Adaptable Electric Steel Co. Has two plants for forgings with various-sized furnaces, thus making economical operations possible, as each plant handles that kind of work which it is best fitted for. Photographs of operations especially good. SIDNEY G. KOON, *Iron Age,* 5-4-22, 2000 w. APS.

Direct Method of Steel Manufacture. Speculation and research on this problem has continued for 50 years. Discussion of Bourcoud process. Reduction of ore is by gases (as in other cases) and new gas producer is developed, using coal, lignite, coal and peat mixtures, oil, tar, natural gas, etc. The efficient application of the gases. Outline of process is given, and the estimated economical results, leading to the conclusion that such a direct process has possibilities not only in those localities

possessing natural resources of iron ore and fuel unsuitable for use with present methods of manufacture, but even in the districts where today the bulk of our iron and steel is produced. A. E. Bourcoud, *Iron Age*, 5-18-22, 2800 w. APS.

Leaves from Steel Melter's Notebook. Part 4. Practice in open-hearth steel furnace when natural gas was used for heating and melting. Details of furnace construction. Air supply was insufficient and fan was used to overcome difficulty. Air volume calculations. Henry D. Hibbard, *Iron Age*, 5-4-22, 2000 w. APS.

Accuracy in Temperature Measurements. Accuracy is essential because of variations in the steel. Effect of errors in instruments. Potentiometer pyrometer is recommended. Method of cold junction compensation by resistance coil. Remarks on thermocouples with reference to standardization. Noble metal thermocouples calibrated by Bureau of Standards should be used for reference. Horace C. Knerr, *Forging & Heat Treating*, 5-22, 3000 w. APS.



The upright columns represent pig iron production each year from 1860 to 1922. The 100 line shows normal output, and the heights of the columns indicate the percentage by which actual output was greater or smaller than normal. The dotted line shows interest rates on commercial paper, multiplied by 10. Cross-hatched columns show years of depression.—*(Leonard P. Ayres, vice-president, Cleveland Trust Co.)*

Corrosion. Attention is called to type of electrolytic corrosion due to action of electrolytic cells which corrode metals in certain anodic areas, position of these areas and electromotive force of cell being governed by differences in concentration of substances dissolved in corroding solution. Of interest in connection with pickling of steel. R. J. McKay, *Trans. Am. Electrochem. Soc.*, 1922, 10 pp. CJW.

Carbonizing Process. Relation of time and temperature to depth of case. Theodore G. Selleck, *Amer. Soc. for Steel Treating*, 5-22, 3000 w. APS.

Acid Open Hearth Steels. Discussion of underlying principles and necessary furnace practice for production of high-grade nickel steel for gun tubes and shafting. Comparison of pig, scrap and ore process used in America with all-scrap process used in Europe. Steel should be brought at moment of teeming to desired composition in every respect. Temperature must be accurately regulated. Retention of inclusions must be restrained by deoxidizing molten metal as fully as possible by means of carbon or pig iron, because product of its oxidation is gaseous and escapes, whereas those of all other deoxidizing agents are solid or molten and tend to remain as inclusions. Nearly complete deoxidation by carbon should be followed by further deoxidation by silicon. Manganese should not be added until after this silicon has done its work of deoxidation, in order that as little as possible of it may oxidize. Steel should be held in ladle moderate length of time to allow inclusions to rise to surface and also for much more important purpose of permitting finished steel to fall to proper temperature for casting into successful ingot. Furnace hearth should be protected from iron oxide by covering it, before charging scrap, with about half of pig iron used. W. P. Barba and H. M. Howe, *Chem. Met. Eng.*, 5-17-22, 2000 w. CJW.

Effect of Sulfur on Rivet Steel. Results of large number of tests by joint committee on investigation of phosphorus and sulfur in steel, shown mostly in form of curves. Sulfur up to 0.1% in well-made rivets does not affect hot or cold shortness, practically no effect on tensile properties, little effect on elongation; an unmistakable deterioration in impact strength is noted above 0.06% sulfur, which is accelerated by annealing. There is practically no effect on hardness of torsional properties. Static strength of rivets in single or double shear is closely approximated by shearing strength of rivet bar, and equals 38,200 lbs. per sq. in. for basic open-hearth steel containing 0.11 C., 0.43 Mn., 0.01 P. and 0.03 S. Each 0.01% sulfur decreases this value 300 lbs. per sq. in. The maximum sulfur now allowed in structural steel rivets (0.045%) is at least 0.01% below point where sulfur will damage strength of well-made rivet steel, as far as its performance can be predicted by known tests. E. E. Thum, *Chem. Met. Eng.*, 5-31-22, 1800 w. 15 curves. CJW.

Identifying Special Steels. Description of new French method, and apparatus included in it, for identifying special steels thermoelectrically. The process has been devised and perfected by M. Galibourg, and is based upon utilization of electromotive forces of contact. No special treatment of the steel is necessary, nor does heat treatment or other processing change the results greatly. A number of materials have been tested, and charts have been plotted for them. *Iron Age* (translation from *LeGenie Civil*), 5-11-22, 880 w. MAH.

Brands vs. Analysis in Buying Tool Steel. Arguments for and against proposed standardization. The chief arguments against analysis purchase are that care and selection of raw materials, melting, hammering, reheating, rolling, inspection, etc., do not necessarily affect the analysis, but do affect the quality of the finished product. Skill and honor are necessary in making a good product. Roy H. Davis, *Iron Age*, 5-25-22, 3500 w. APS.

Purchase Specifications of Steel. Necessity for exact specifications in export trade because of varying significance of similar terms in different countries. Differences in standard threading. Specifications for bolts, nuts, rivets, wire and nails. Standard packings. Special finishes. Tables of comparative sizes of metric and inch threads. Metric and inch and gage sizes of wire, etc. José Maria Garmendia, *Export*, 5-22, 5000 w. APS.

Selective Case-Carburizing. Electrolytically deposited plate of copper furnishes most satisfactory metallic coating to produce localized case-carburizing. Non-metallic coating consisting of definite mixtures of sodium silicate with either finely ground asbestos or alumina furnishes good protection from carburizing conditions. It is easily painted on metal and may be removed by immersion in molten sodium hydroxide or by quenching in water. Colchloride in molten state is also useful in loosening these coatings. It is not felt that these coatings have universal application but it is believed that there may be many times when their use may not only be possible but also profitable in heat-treating shops. The coatings mentioned are not as efficient in preventing decarburization as they are in preventing carburization. W. P. Wood and O. W. McMullan, *Chem. Met. Eng.*, 6-7-22, 2500 w. CJW.

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LEATHER

Large Leather Stocks on Hand

ACCORDING to a recent estimate based on United States census figures, there is enough leather on hand to make 100,000,000 pairs of shoes. This supply is believed to be sufficient to permit tanneries to close down for the summer without seriously disturbing the shoe business. Census figures show that on March 31, 1922, there were 8,600,000 dozen pairs of cut soles, 11,600,000 backs, bends and sides of sole leather, 23,800,000 goat and kid skins, 8,600,000 calf and kid skins, 8,100,000 sides of upper leather made from cow hides, which makes a total of 250,000 feet of upper leather on hand. In addition there is also a quantity of horse-hide leather splits, cabretta, sheep, deer and elk leather. Altogether, they easily total to more than 300,000,000 feet of leather.

However, *American Shoemaking* points out that the census of leather stocks is a recent innovation, and that there is no means for making an accurate comparison of present accumulations with those of former periods. Never before in the history of the trade has demand been so whimsical—taking certain favored kinds of leather as fast as they could be produced, sometimes calling for more than the raw material made it possible to produce, and yet leaving enormous stocks of good leather of other kinds with no bidders for them. If a two months' shut-down were to take place now, every shoe manufacturer would have to exercise his ingenuity in making the best of what he could get and the retail stores would have to make their standards of quality more elastic.

Care of Leather. Suggestions for judicious selection of articles made from leather. Discusses selection and care of shoes, such as drying, oiling and greasing, waterproofing and polishing, harness, driving belts, book-binding leather and miscellaneous leather goods. F. P. VEITCH, H. P. HOLMAN and R. W. FREY, *Farmers' Bulletin,* No. 1183 (1922), 22 pp. CJW.

Story of Artificial Leather. Description of materials and methods used in producing artificial leather. Cotton fabrics form actual foundation for building, and gun cotton is one of the principal ingredients of solution smeared over the cloth to form the imitation fabric. Article describes methods and equipment for washing and tentering, dyeing and bleaching, napping, special finishes, like whip cord weaves, moleskin, alligator, pebble, straight grain, etc., finishing coats, drying and deodorizing. Uses for artificial leather are also given. *New West Trade,* 6-3-22, 2000 w. WRB.

Romance of Leather and Its Importance to Mankind. Part two. Continuing discussion of antiquity of leather using and asserting that its first use antedates written history. Cites instance of leather chair now in Cairo which had been buried 33 centuries and is still in prime condition. In early Egypt leather cutters formed a distinct sort of guild, and produced some very artistic work. They were of the third caste of society, next below the military, huntsmen and agriculturists. Thin leather in long rolls often used for writing—leather had a wide range of uses. Art of tanning and dyeing well developed in ancient Egypt; lime was used for dehairing. Illustrated. *Shoe Repair Service,* 6-22, 2000 w. WRB.

New Shoe with Moulded Insole. Description of a method to mould shoes to fit the feet, and in a manner permitting volume production. The principal feature of the shoe is that upper part or surface of sole, on which foot rests, is moulded to fit foot and resembles impression left by bare foot in pliable, moist sand at the seashore. The sole contains permanently moulded hollows or depressions into which projecting curvatures of foot rest, and rising curved surfaces that fit up under the several raised parts of foot. *Shoe Retailer,* 6-33-22, 2000 w. WRB.



(Louisville Courier-Journal)
"His bum steer."



(Indianapolis News)
"One way out of it."



Market for Copper Reviving

INTENSIVE advertising, coupled with real merit, has been responsible for winning back the markets for brass and copper. The fact that their place was taken during the war by cheap substitutes and that huge stocks were piled up at the close of the war created a serious problem for producers. However, they were aided in their effort to win back customers by the rapid deflation in selling prices.

In view of the building boom and the revival in other trades, it is believed that demand for copper and brass will steadily increase. Because of copper's great malleability it is extensively used for both interior and exterior construction work. It is estimated that 27 tons of copper wire and 90 tons of brass were used in the Woolworth building alone.

The value of copper as a rust-resistant also adds to the variety of its uses. Not less than 100 different automobile parts are made of copper and its alloys.

The stability of brass prices is indicated by the fact that although house furnishings and building materials went up to nearly two and a half times their former prices, and are now almost twice as high as they were before the war, brass is today selling at 15¾ cents, only one quarter of a cent more than the price at which it was sold in 1913.

Stellite. Stellite is alloy of cobalt chromium and other semi-rare metals. Does not oxidize deeply even at high heat, becoming covered with film of oxide, finally turning deep blue-black. Best results in welding is with use of oxy-acetylene torch; taking bars as made from scrap pieces of stellite, using silicate of soda as flux and making shape or form of tool desired. H. A. STEWART, *J. Am. Welding Soc.*, 4-22, 800 w. CJW.

Manganese Bronze in Engineering Work. Physical and chemical properties of manganese bronzes. Uses in engineering work, valves, trunnions, propellers, bushings, etc. Castings of 12 tons. Details of melting furnaces and foundry work. *Iron Age*, 6-1-22, 1500 w. APS.

Chromel Castings, Bars, Wire and Ribbons. Chromel is nickel-chromium alloy with high chromium content. Used for high temperature work in pyrometers, furnace resistances etc. Description of casting ingots, hot rolling, drawing in bull plates, and diamond die drawing, six figures. E. F. LAKE, *Brass World*, 5-22, 2000 w. (To be con'td.) APS.

Marketing Silver Bullion. Importance of silver as a money metal, especially in Asia. Magnitude of the trade. The uses of silver. Annual production figures. Methods of trade, assaying, storage, insurance, etc. The establishment of prices at the various centers. Table of prices since 1910. PARKER D. HANDY, *Eng. & Min. Jour-Press*, 5-6-22, 2500 w APS.

Copper Smelting in Central Africa. Ore dug out with hoes and hatchets, carried to copper smelter with his "medicine"; he spread out layer of charcoal 1.5 ft. in diameter, and placed on this successive layers of copper ore and charcoal, the whole being walled with clay 1.5 in. thick. When 3 ft. high, top sealed, and flame accelerated by bellows. Copper slag was collected and remelted. S. H. BALL, *Eng.-Min. J.-Press*, 4-22-22, 750 w. CJW.

Zinc-dust Fires. Fires in zinc-dust have sometimes given particular trouble owing to their resistance to extinguishers and liability of explosions. Foamite extinguished fire most quietly and effectively. Three 2.5 gallon foam extinguishers smothered fire from 300 lbs. zinc dust, but danger of rekindling passed on only after elapse of several hours, due to retention of heat in metal by non-conducting foam blanket. Although some fire-extinguishing materials may be injurious or may be decomposed in fires to produce toxic gases or vapors, no especial poisonous gases or fumes are evolved from burning zinc itself or from action of extinguisher material on zinc. S. H. KATZ and J. J. BLOOMFIELD, *Textile Colorist*, 6-22, 2000 w. CJW.

Welding Monel Metal. Must be deoxidized in producing satisfactory arc-welds. These agents best employed in form of alloys, ground to 50-100 mesh and applied to welding rods of bare Monel metal as thin coating. May vary within moderately wide limits, but should introduce 0.05% to 0.50% magnesium, 0.20% to 1.0% silicon, and at least 0.20% manganese, an excess of which is not harmful. May also use nickel-magnesium, nickel-copper-magnesium, or nickel-magnesium-silicon alloy. Aside from use of special deoxidizer, arc-welding of monel metal is not essentially different from that with steel. P. D. MERCIA and J. G. SCHOENER, 5-22, 1500 w. CJW.

Arc-Welding Structural Steel. Tests made to determine reliability of welded joints and limiting conditions of various types of joints. Welding costs are less than riveting costs. Welded joint is fully as dependable as other joints. Cost data. E. S. HUMPHRYS, JR., *Iron Age*, 5-25-22, 7 Figs., 400 w. APS.

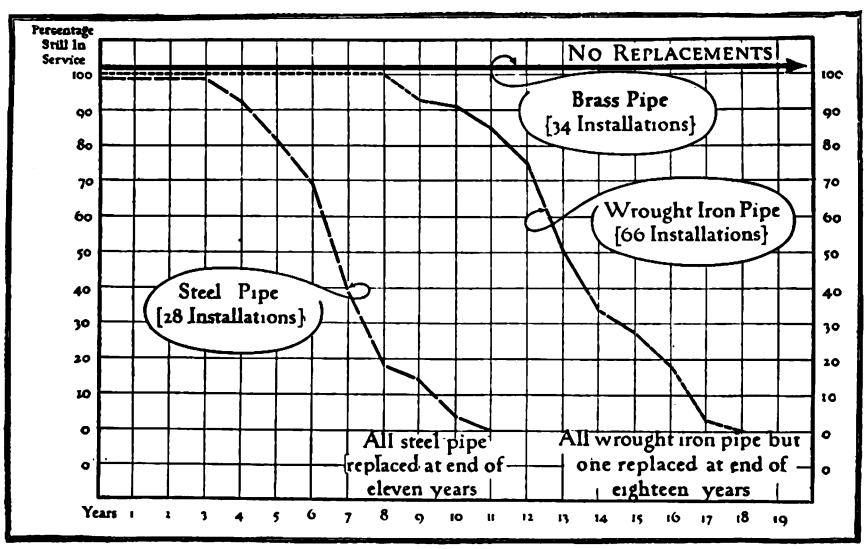
Standardized Costs for Sheet Metal Workers. Chapter 16. Proper application of shop overhead. Favors direct labor method of applying burden. Where much power machinery is used machine rate method of applying burden is advisable. Administrative and selling expense. ALFRED BARUCH, *Sheet Metal Worker*, 5-12-22, 3200 w. APS.

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100 per cent. performance of brass pipe. The significant result of a survey by the Copper and Brass Research Association covering hot water service in more than 100 apartment houses containing 1000 apartments.

LUMBER·WOOD PRODUCTS

Demand for Hardwood Increasing

A STEADY and encouraging growth is noticeable in the demand for hardwood, and although at present this demand is being taken care of by reserve stocks, it is expected that because of very limited production the market will soon reflect the scarcity of stock. According to the *American Lumberman,* the flooring and interior trim manufacturers are the leading buyers. The automobile industry is also buying all the lumber it can find suitable to its needs, and agricultural implement manufacturers are transacting a considerable volume of business. If the expectations in regard to successful harvests are fulfilled, heavy demands are certain to be made this fall upon the retail lumber dealer for boxes, crates and packing lumber, and upon the agricultural implement and wagon manufacturer for new equipment requiring hardwood in its construction, as well as upon the suppliers of the farmer's numerous other wants.

Although there has been a decrease in buying by the furniture interests, this is said to be strictly seasonal. The furniture makers are unanimous in predicting a heavy business in furniture this fall, and a number of factories are planning to operate to capacity. All other domestic hardwood consumers are represented on the market, with a big aggregate of requirements. Even surpluses of the lower grades of hardwood have been materially reduced by the box and packing-crate interests, which have been active in the hardwood market recently.

Forest Products Industries of South. South's annual lumber cut is 11 billion feet and its products are valued at 310 millions dollars, giving employment to 250,000 men. Eighty-five per cent of remaining virgin yellow pine will be cut in 5 years or less and in 20 years all mills except 12 will have been reduced to only 3% of 1919 output. Climatic and labor conditions of region are such that timber can be grown cheaper than in any other part of country. Reforestation imperative. Research needed to solve certain problems which prevent or retard economic success of certain possible by-products of lumber industry. Discussion of rosin and turpentine industry from gum and chips and of the wood chemical industry. Another field is pulp and paper and ethyl alcohol from wood by fermentation. Allied interest is timber preservation. C. P. WINSLOW, *Chemical Age,* 4-22; *J. Ind. Eng. Chem.,* 5-22, 2500 w. CJW.

Commercial Woods of Pacific Coast. Total of 1707 billion feet of timber in Pacific Coast States available for lumber manufacture. Includes Douglas fir, Sitka spruce, Western red cedar, redwood, Idaho white pine, California white and sugar pine, incense cedar and Montana larch. Tables show annual production of each species, estimated stands, uses, properties and physical characteristics. C. W. GOULD, *Timberman,* 4-22, 3000 w. HHH.

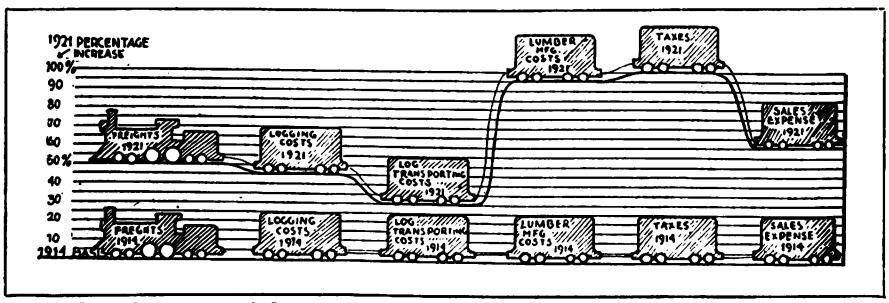
Pacific Hemlock. Use of Pacific hemlock increasing. Wood is moderately strong, of fine, even grain, light in weight and color, odorless when dry. Soft enough to machine easily, yet hard and firm enough to wear well and take good polish. Usually considered free from pitch or resin, since resin cells are few and scattered and do not affect uses of wood. Green Pacific hemlock contains relatively large amount of moisture, amounting to from 40% to 60% of its oven dry weight. Seasoning of great importance in reducing weight of lumber products before shipment. Chief uses of hemlock are in light construction work, flooring, car material, sheathing, boxes and crates, caskets, kitchen furniture and in substructure of veneer furniture. *Timberman,* 4-22, 2500 w. HHH.

Practice of Forestry. Requirements for keeping Southern pine lands productive are: (1) That 4 seed trees of longleaf pine or 2 seed trees of any other kind of pine be left standing on each acre of land cut over, or an equivalent of 40 and 20 trees on each acre. (2) That all tops and slash left in logging be removed to distance of 20 ft. from seed trees, unless twice prescribed number of seed trees be left per acre; slash to be burned first winter or protected by patrol and fire lines for 5 yrs. (3) Cut-over lands when reseeded to be protected from fires at all seasons for first 3 yrs. in case of longleaf pine, 10 yrs. in case of other pines, after which less careful protection is sufficient. R. D. FORBES, *Lumber Trade Jour.,* 4-2-22, 1200 w.

Uses of Basswood. Basswood one of most widely used woods for reason that, with exception of willow and buckeye, it is lightest, softest, weakest of hardwoods; neither stiff nor tough, of even grain, white color, extremely easy to work with. Most important factory uses of basswood include: boxes and crates, millwork, woodwork and novelties, furniture and fixtures, trunks and valises, picture frames and molding, excelsior, musical instruments, toys, agricultural implements, vehicles, matches, refrigerators, car construction, laundry appliances, tobacco boxes. Also used for sounding-boards for pianos and organs, and in manufacture of veneers and plywood. *Lumber and Veneer Consumer,* 3000 w. HHH.

What and Why a Cord? Critical comments on present systems of buying wood by old cord measure. Rot and bark important factors. Suggestion made to buy on weight basis, but this offers certain difficulties. Questionnaire has been circulated among mills to determine general method of wood measurement. B. T. MCBAIN, *Paper Trade J.,* 5-25-22, 1000 w. CJW.

Methods in Rubbing and Polishing. Three classifications of varnish—short oil, medium and long oil, depending upon whether they contain relatively large or small amount of oil. Varnish short in oil will dry much faster and rub easier than one long in oil. First step is to secure smooth surface by rubbing down with block of rubbing felt and medium coarse pumice stone and water. Rubbing with fine pumice follows, using paraffin oil instead of water. Obtaining good polish dependent on quality of polishing liquid employed. Following formula will produce durable polish with minimum amount of labor. Paraffin oil, 1 gal.; turpentine, 1 gal.; oil of cedar, 20 oz.; oil of citronella, 12 oz. Most difficult of polishing operations is known as "spiriting off." Speed and correct amount of alcohol used on polishing cloth the vital factors in determining perfection of final results. WALTER K. SCHMIDT, *Furniture Manufacturer and Artisan,* 4-22, 2000 w. HHH.



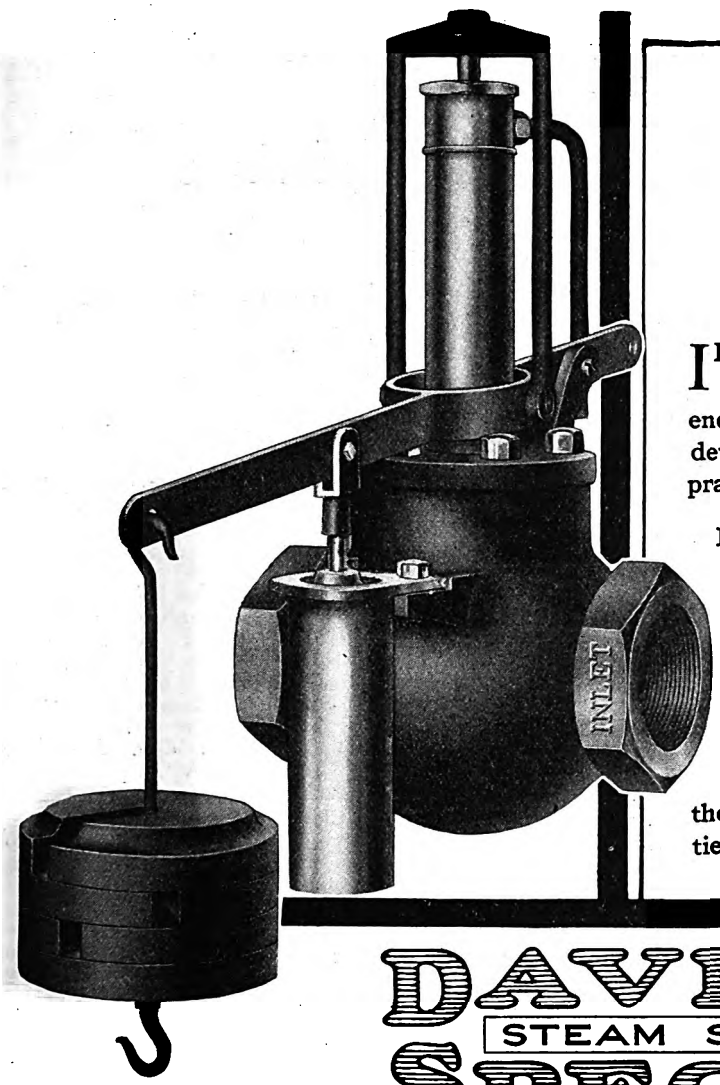
Graphic illustration of the increase in lumber costs since 1914.—*(Wood Turning.)*

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In gauging the value of Davis Valve Specialties you need not rely entirely on your own experience. Their ability to give care-free valve service at minimum cost has been written on the pages of the world's power plant log since 1875.

Davis time-tried features and authoritative design are found in the specialties listed below:

DAVIS VALVE SPECIALTIES

STEAM SAVERS SINCE 1875

USERS *know*. They will tell you that the longer you use Davis Equipment, the less it costs.

The strongest argument a Davis salesman can offer is the opinion of Davis users.

For however varied plant conditions the statement is always the same; when you put in Davis equipment you can forget it, but it will never forget you —or your coal bill.

Write for description of these time-proved specialties.

Balanced Valve
Water Control Valve
Exhaust Relief Valve
Water Relief Valve
Stop and Check Valve
Steam Trap
Pump Governor
Emergency Stop Valve
Flow Regulator
Non-Return Valve
Fluid Lever Controller

The Davis Regulator—the regulator that has no springs to fail or diaphragms to cause trouble and shorten its life. Utilizing the positive principle of the simple balanced scale, it maintains a constant reduced steam pressure regardless of fluctuations in the higher pressure. Sizes ½ to 14 inches. Illustrated above.

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The Davis Float Valve has a single seat with a renewable composition disc which makes it close tight and prevents leakage. It keeps the water in a tank or reservoir at a constant level. Sizes ½ to 14 inches.

Write for details of these and the other valve specialties, listed opposite, to the G. M. Davis Regulator Co., 409 Milwaukee Ave., Chicago.



Replacing Skilled Labor with Machines

THE scarcity of skilled labor now becoming apparent is expected to result in an increased demand for machinery and machine tools. As the wages paid to skilled workmen advance, a greater effort is certain to be made to cut down costs and speed up production by the use of labor-saving machinery. In supplying the need for industrial equipment of all kinds, the machine industry is offered an opportunity for development along original lines. In many instances an effort will be made to secure greater production with the same number of machines, thereby creating a demand for a high-grade product instead of the mere jobbing-shop type.

The *American Machine and Tool Record* points out that if the monthly barometer of figures available were giving the flow of orders by units or number of machines sold, instead of by a percentage of dollar values based on orders received during the first quarter of 1922, there would be evident a decided improvement in the machine-tool business over six or nine months ago. Prices are lower and therefore the percentage of orders based on dollar values is misleading and does not show the increasing activity.

Tool Design Standards. This article follows along the lines of, although entirely separate and distinct from, an earlier article on the same general topic. This one takes up the development of standard instruction sheets for the use of tool designer. As the author points out, much time is spent by tool designers in looking up dimensions on tools already made, also much time is wasted in designing similar details again and again. And in other ways, the lack of a uniform method of procedure wastes a great deal of valuable time. This author's plan is to standardize the method of procedure and instruction sheets to tool designers, so no work previously done will be done over, and no ground once covered will ever be retraced by someone else. H. P. LOSELY, *Machinery*, 5-22, 2750 w. MAH.

Production Work in a Contract Shop. Second of a series of articles describing work done by the Taft-Pierce Mfg. Co., Woonsocket, R. I. This article describes the unusual methods used in machining and testing an aluminum automobile fan for the Wills Sainte Claire motor. The bore of the hub includes a number of micrometer fits, while the fans must be in correct static and running balance. The shaft is described as well. *Machinery*, 5-22, 2800 w. MAH.

Careful Tool Set-Up Assures Better Production. Many and great possibilities in use of automatic machines, both single spindle and multiple, which are maximum production tools, and should be kept in such condition as to permit working at maximum rates all the time. All setting should be properly made in advance, effective feeding mechanism must be available to cut unproductive time, plenty of room must be provided for operator and extra stock, gears must be kept quiet and well lubricated, belts must be in good shape, good planning and sufficient forethought are necessary. Other pointers are given. DONALD A. HAMPSON, *Can. Machinery*, 5-4-22, 4500 w. MAH.

Machine Molding Thin Cylinder Castings. Textile machinery, thin cylinder with five re-entrant ribs. Difficult machine casting problem. Details of solution of problem. *Iron Age*, 6-1-22, 5 photographs, 2000 w. APS.

Soldering Fluxes for Machine Construction. Author looks upon welding, soldering, brazing and similar processes, in this case, as auxiliary tools for keeping the machine shop running all the time. He tells how to prevent oxide or rust, how to clear it away in a welding or soldering case, how to prepare the various fluxes, how to use them, how to unite dissimilar metals, and gives other pointers. W. B. STANDIFORD, *Can. Machinery*, 5-4-22, 1900 w. MAH.

Bits. Following recommendations are made: Provide adequate containers for carrying bits and establish proper system of transportation and recording. Equip blacksmith shops with apparatus to resharpen bits to these specifications, quickly and at low cost and thus obtain advantages of properly shaped and absolutely uniform bits. Purchase proper steel for cutter bits and see that bits are intelligently and carefully heated and tempered for particular conditions prevailing in each mine. Lay special emphasis on importance of exercising care to avoid burning of steel. C. B. OFFICER, *Coal Age*, 5-18-22, 2000 w. CJW.

Pipe-Threading Tools and Their Manufacture. Modern type of pipe-threading die-stock is adjustable, so that several different sizes can be cut. Usually the number is four; medium size would cut 1-, 1¼-, 1½- and 2-inch threads. Methods used in making Beaver die-stocks and chasers. Illustrations include special turret lathes, special multiple-spindle drills, special broaching equipment, special duplex millers, etc. FRED R. DANIELS, *Machinery*, 5-22, 3600 w. MAH.

Comparator for Checking Precision Gage-Blocks. Pratt & Whitney use an interferometer or millionth comparator as an additional safeguard against mechanical errors in the manufacture of precision test blocks. This unusually delicate and accurate machine is used following the optical tests. The article describes the apparatus in detail, also the methods of using it, and the results obtained. FRANKLIN D. JONES, *Machinery*, 5-22, 4100 w. MAH.

Characteristics of the Different Forms of Gears. This is another part in a long series on this subject. The present article deals with the classification of gears, the continuity of tooth action, advantages of the herringbone action, molding generating process, etc. CHESTER B. HAMILTON, *Can. Machinery*, 4-30-22, 3350 w. MAH.

Gears Classified by Shaft Arrangement. Continuation of series of articles on gears in all phases. This article takes up their classification, particularly those whose axes are in different planes but not necessarily parallel. This includes worm wheels, in the helical, spiral and skew types. Author describes each, and tells how the tooth is generated or cut. He goes into their relative efficiencies somewhat, and reasons for the use of one in preference to the others. CHESTER B. HAMILTON, *Can. Machinery*, 5-4-22, 3200 w. MAH.

Advantage of Roller Bearings. Power consumed by spinning frame is considerable. Until recently comparatively little effort spent in improving bearings on cylinder shaft which delivers power to drive spindles and other parts of machine. Recent tests show power saving of more than one-half horse-power per frame, with exceptional durability and oil saving. C. W. NUGENT, JR., *Textiles*, 5-22, 1000 w. MBB.

Inspection of Mill Reduction Units. Niles-Bement-Pond methods outlined. Inspecting correctness of tooth shape and spacing; measurement of eccentricity, determining helix angle, checking shaft alignment, etc.; eight figures. R. H. RAUSCH, *Iron Age*, 5-25-22, 2000 w. APS.

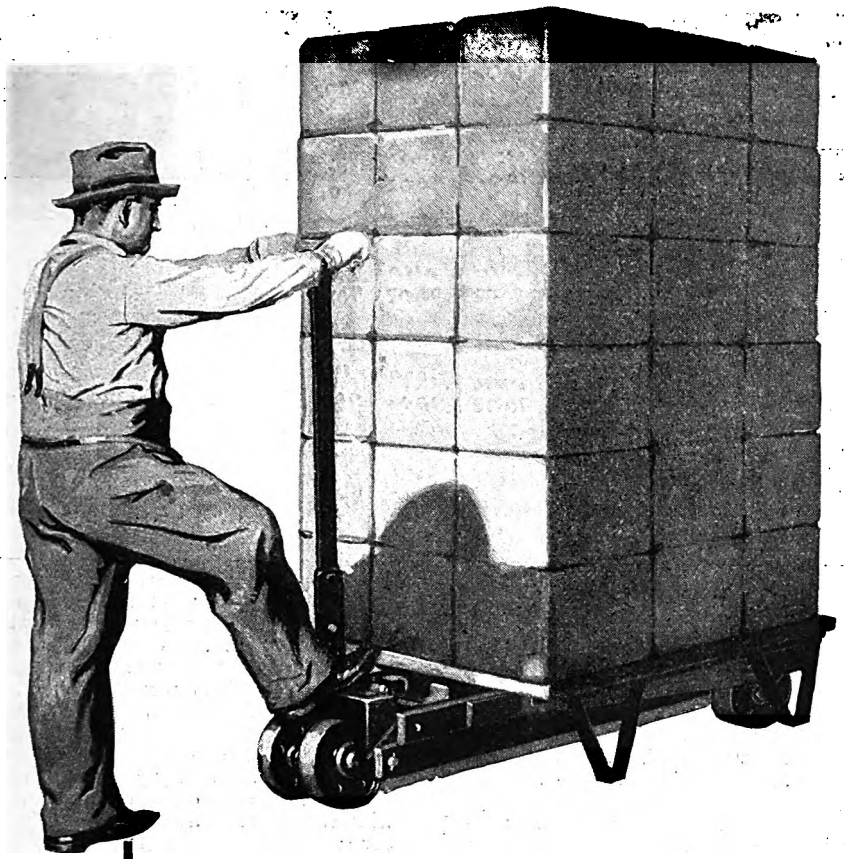
A-B-C of Sheet Metal Working Machinery Application. Methods of double seaming by hand and machine with description of several types of double seaming machines suitable for various types of work. L. BROEMEL, *Sheet Metal Worker*, 5-12-22, figures, 1500 w. APS.

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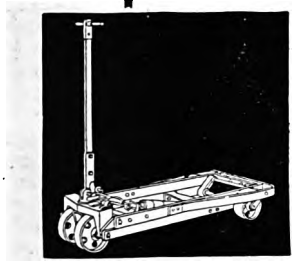
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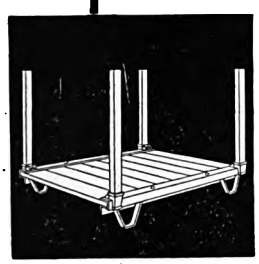
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Mr. Irving T. Bush, manager of the great Bush Terminal in Brooklyn, says: "We have experimented with a number of trucks and have found the Stuebing Lift Truck System the cheapest and most efficient for our service."

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Paper Industry Returning to Normal

ACCORDING to the official organ of the American Paper and Pulp Association, October or later September will probably see the paper industry back to its normal position, which it can be expected to maintain through the next winter and spring, at least. Paper production and shipments for March were the largest since October, 1920. Although production is now equal to normal consumption, business is retarded because of the amount of over-capacity in the paper industry. For the next few years this will, no doubt, be the chief source of difficulty. It is believed, however, that if new machines are not added to the already over-equipped industry that the line of normal growth of consumption will steadily advance to meet the country's capacity.

According to figures prepared by the Department of Commerce, exports were higher during March than during any month of 1921. But they are much lower, in proportion to production, than was the case in 1914. Since then the war exports have fallen off rapidly. In the case of newsprint, wrapping and book, three of the most important grades, the export percentage increased from 2.1% in 1914 to 7.5% in 1919, but dropped in 1920 to 3.6%, and in 1921 went below the 1914 figure, dropping to 1.9%.

Bamboo for Paper. Philippine Islands contain about 5,000 acres of bamboo, each of which should produce about 40 tons of pulp. This acreage capable of supplying 20-ton mill for 3 years without counting on growth of bamboo during this period. Working on 3-year rotation period would supply mill indefinitely. Quotations are given on use of soda and sulphite processes. *Paper Trade J.*, 5-18-22, 1000 w. CJW.

Bleached Groundwood. In order to secure continual production of high-grade bleached groundwood pulp there must be regulation within close limits of moisture content of pulp on wet machine or in bleaching engine by suitable means, as keeping wet machine felts clean, pressure properly adjusted and by measuring both water added to engine in inches and moisture content of pulp furnished. Use of only good, sound white spruce, balsam or poplar, thoroughly barked. Grinding conditions carefully specified and adhered to. Standardization and close regulation of all features of work pertaining to bleach itself, such as solution of definite and constant strength, temperature during application of solution kept constant at 40-60° C. as limits. If bleached on wet machine, frequent testing of bleached pulp for acid residues, indicating that bleach should be cut down, keeping all iron and metal work well painted with good acid-proof paint wherever it might be attacked by solution. Generally close supervision of steps of process, bearing in mind that it requires same degree of attention as does bleaching of any fiber. A. O. Bragg, *Paper*, 4-26-22, 3000 w. CJW.

Testing Sulfite Pulps. Chlorine consumption method is proposed as method of determining approximate amount of lignin in pulp. Test must be performed at definite alkalinity of reaction liquid and at same temperature. Some relation between lignin content and chlorine consumption number and between these and bleaching capacity of pulps. R. Sieber, *Pulp Paper Mag.*, 5-25-22, 1500 w. CJW.

Centrifugals in Soda Process. Desirous to remove black liquor from pulp as soon as possible to decrease bleach consumption and with as little dilution as possible to economize on recovery. Test with 10-in. Elmore continuous centrifuge showed that above 1950 rmp moisture content of pulp was fairly constant at 57%, but balling of pulp was objectionable feature. Might be eliminated on larger machine. Washing tests on small machine were not satisfactory, but further experiments would be interesting and might be profitable to one contemplating construction of new mill. J. R. Kessler *and* G. N. Collins, *Paper Trade J.*, 6-1-22, 800 w. CJW.

Yield and Strength of Soda Pulp. System which will prevent oxidation either by use of deoxidizing solution or by circulating system that will cover or submerge and penetrate all parts of mass alike and avoid as far as possible high temperatures will surely enlarge yield and improve quality of product. No system as effective as positive pump, so arranged that liquid may be circulated in either direction. M. L. Griffin, *Paper Trade J.*, 4-13-22, *Paper Mill*, 4-15-22, 750 w. CJW.

Specifications for Limestone and Lime for Sulfite Pulp. Definitions of limestone and quicklime, composition of each, method of sampling and testing as submitted by the Committee on Sulfite Pulp (Revised Mar. 15, 1922). *Paper Trade J.*, 4-13-22, 1200 w. CJW.

Cleaning Pipes of Wood Pulp Deposits. Ground wood pulp (1 to 200 water) is transported 6000 feet with 33-foot fall through two 8-inch and one 12-inch pipe. Pipe is wood stave, wire bound. Pipe gradually fouled, reducing carrying capacity, and was found coated with slime. By an ingenious method of taking out a section of pipe and inserting a scraper which would be forced along by the water pressure the pipe was cleared rapidly. Three men working one 8-hour shift cleared 3000 feet of pipe in two sections. Howard L. Ropes, *Paper Mill*, 5-6-22, 1500 w. APS.

Silicate of Soda. Discussion of various forms. Silicate will produce joint much stronger than paper, and this joint will resist temperatures which would destroy paper and endures for time much greater than paper box is required to serve. Therefore strongest link in structure known as corrugated paper. Spreading capacity of silicate has improved with result that much less need be used. Best silicate is cheapest, because loss in waste board and labor greatly exceeds total cost of silicate. J. G. Vail, *Fibre Container*, 5-22, 1000 w. CJW.

Manufacture of Waterproof Paper or Board. Depends upon introduction of asphalt simultaneously with formation of sheet. Asphalt is emulsified in such way that it forms non-adhesive emulsion. Highly colloidal clay used as emulsifying agent. Emulsion handled with pumps and may be introduced into beater or at machine. More convenient to handle emulsion at machine by introducing it into suction side of fan pumps which withdraws water from inside of cylinder molds to return to screens with raw stock on its way to vats. Asphalt acts as loading material without retarding drying and tonnage is substantially increased in proportion in which it is added. L. Kirschbraun, *Paper Trade Jour.*, 5-11-22, 1500 w. CJW.

Felts. Tentative sizes suggested: variations of only 2 ft. in length in even figures from 24 to 50 ft., then 54 and 56 and from there on, in 4-ft. lengths. Variations in width be confined to 4-in., at least 2-in. jumps. Two standard designs of bottom board felts, one for board where fineness of finish is necessary and another where greatest strength, openness and long life are prime requisites. In corrugated, shathing, roofing, groundwood pulp, and some others, single design should be sufficient. *Paper Trade J.*, 5-25-22, 750 w. CJW.

Accidents in Wood Room. Points out some corrections which will reduce accidents in wood room. Log haul-up should have cleated walk, wide enough for 2 men to pass. Slasher saws should have good, substantial wire screen between saw and operators. Cut-off saw should be protected in same manner. Walks should be provided along chain conveyors to reduce temptation to walk on them. Men running knife barkers should wear goggles. Attachments should be used to protect fingers. Upright splitters cause accidents and care must be exercised. Caution must also be used in chip bin. D. B. Davies, *Paper Industry*, 4-22, 1500 w. CJW.

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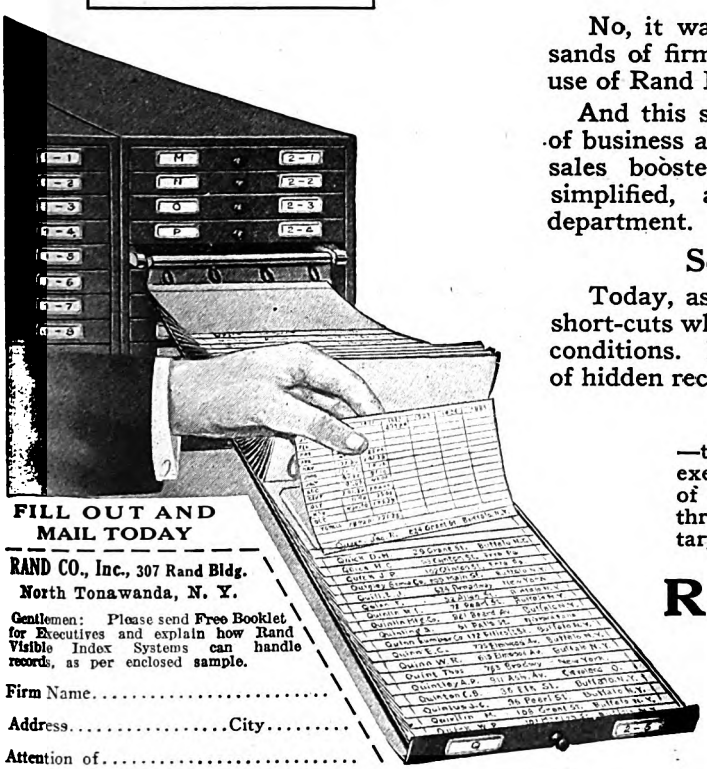
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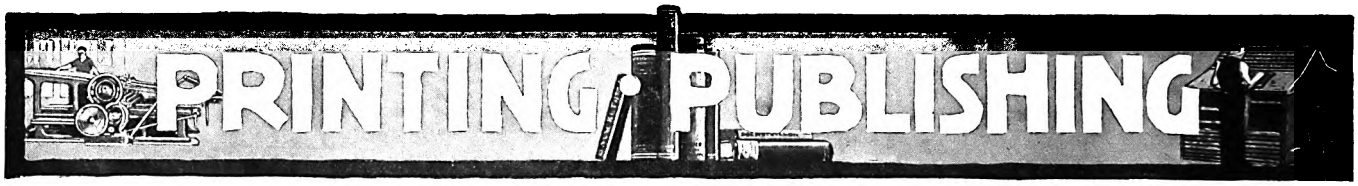
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Are Newspapers Profiteering?

THE high cost of newspaper space today is said to cut down profits on the goods advertised to such a degree that in many instances advertisers can no longer afford to use this means of presenting their message to the public. The increase in the rates of 282 leading daily newspapers is 79% over the rates in 1913, the increase in circulation 23%, and the increase in the rate per line per million circulation 46%. A number of advertisers have adopted the direct-by-mail method with notably successful results. Others have advertised their products by means of posters, and street-car cards and many have substituted magazines for newspapers when apportioning their advertising appropriations.

However, newspapers assert that they are not profiteering, that costs over which they have no control have forced them to raise their rates to the present level. According to the *Editor and Publisher* costs today are about 100% above those of 1913. Although paper is considerably cheaper than in 1920 and 1921 it is pointed out that newspapers did not set their rates on the basis of 14 cent spot market paper. Many of them were paying less than that for the greater part of their supply—the rates were made largely when contract paper was seven cents a pound f. o. b. mill. Those rates would not have been sufficient had the panic period in the paper market continued, and most newspapers would have been forced to increase their charges still further or go out of business, according to this magazine. With paper at $75 a ton it is still more expensive than in 1913 and there are no indications that it will approach closely to the 1913 level for several years, while spot paper shows signs even now of rising. This reason alone, it is said, would justify an advertising rate of 79% above the 1913 price, if there were no other factors And in addition to the cost of paper, there are to be taken into consideration the expense incurred by the adding of editorial features, the wages of mechanical employees, and other operating costs that can only be reduced gradually, as the cost of living is reduced.

Evolution of Bookmaking. Last of two instalments, giving a short history of bookmaking in its earliest stages. This article deals with Caxton and contemporaries, pointing out the characteristics of early production, and describing the troubles of the early printers. JAMES MACLEHOSE, *Ben Franklin Monthly*, 6-22, 2500 w, illustrated. WRB.

Law of the Press. Third of a series, this instalment dealing mainly with the trial of criminal actions in newspapers. While practice is already restricted, author believes further bars should be raised in many States to prevent interference with courts. The author, a lawyer specializing in newspaper work, develops many points in this phase of publishing and cites many instances in support of his contention. He also covers rights to news, subscription lists as capital assets, "paid" subscribers, and the ethics of publishing in general. ROME E. BROWN, *Editor and Publisher*, 6-17-22, 2500 w. WRB.

Apprentice Training in Europe. Foundation for good journeyman printer must be laid during apprenticeship, in the view of European printers, and it is on that fact that their system is built. Author describes instruction plants and methods in several European centers. MARTIN HEIR, *Inland Printer*, 6-22, 2500 w. WRB.

For Standard Paper Sizes. A review of the work of the United Typothetæ of America in standardizing paper sizes and causing the abandonment of private watermarks. New catalog size of cover stock, 23x33, secured to fit standardized catalog, making for saving in paper stock. Recommendation for paper grade standardization. ALBERT W. FINLAY, *Ben Franklin Monthly*, 6-22, 1800 w. WRB.

True Freedom of People Dependent on Free Press, Says Churchill. British Secretary of State for colonies asserts in London speech that right to criticize must never be taken away. HERBERT C. RIDOUT, *Editor and Publisher*, 5-20-22, 500 w. MBB.

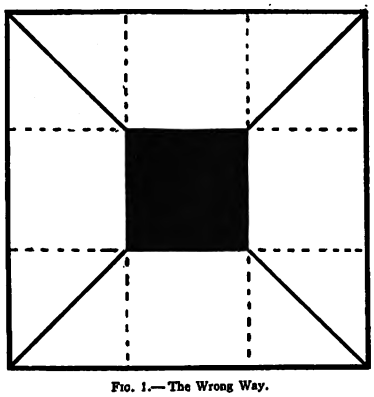


FIG. 1.—The Wrong Way.

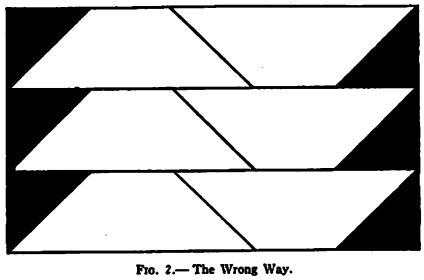


FIG. 2.—The Wrong Way.

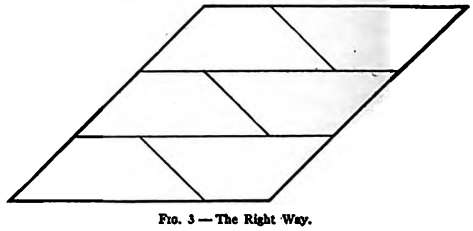


FIG. 3—The Right Way.

THE INLAND PRINTER

How to cut leather for book-covers, loose-leaf devices and for other purposes in the bindery. In Fig. 1, where but four corners are cut in one pattern, the waste is one-ninth of all leather cut in this manner, while Fig. 2, showing six corners to the pattern, shows a waste of one-fifth. Using Fig. 1 as a pattern, but making it larger, holding, say, 16 corners, the percentage of waste remains the same. Do the same with Fig. 2, allowing 12 corners, the percentage of waste is materially lessened. Fig. 3 illustrates how to eliminate all waste. Although Fig. 1 is the wrong way to cut the leather corners, it shows the correct proportions. This is easily ascertained by drawing a perfect square on a piece of cardboard, dividing this into exact thirds on all sides and drawing four straight lines through the square, thus dividing the larger square into nine equal parts. Two straight lines drawn diagonally, with the center square blotted out, give a perfect corner. Dotted lines show division of square. The heavier lines show that a perfect corner is three times longer than it is wide. After marking out the pattern for whatever number is desired, it should be cut to shape, after which the hides of leather are cut to the pattern. All small pieces of scrap left over may be cut singly, thus utilizing practically every bit of the hide. The large pieces are piled straight in stacks of 50 or more, according to the thickness. Next, they are cut into strips on the paper cutter, and the full length of the pattern, after which they are sliced diagonally. At all times the marked-out pattern is brought into play, thus furnishing a guide for the actual cutting. Once the piles are cut into strips, a strong rubber band may be passed around each bunch of strips; this will hold them firmly for the diagonal cuts. As Fig. 3 shows, there is no waste at all when cut to such a pattern.—(Edwin R. Mason, in *Inland Printer.*)



Prices of Cotton Goods Firm

IT is predicted that prices of cotton goods will not fall below their present level for some months to come. There is even a possibility of higher prices this fall, due to the fact that stocks in the hands of retailers are not large and that a certain amount of replenishment must take place. The textile strike has contributed to the firmness of the market, while the coal and railroad troubles are also important factors.

However, it must be remembered that our exports of cotton goods have fallen off considerably since last year and that as Europe recovers there may be heavy imports. Another encouraging factor is the recent cotton rate cut of 30% by Coast shipping lines, which it is hoped may have some effect in lowering the price of manufactured goods. The new rate for raw cotton from Galveston to New York will be 35 cents per 100 lbs. instead of 50 cents, and rates from other points will be lowered in proportion. Boston-Galveston prices will be changed from 76½ cents per 100 to 57 cents, while the charge from Galveston to the heart of the textile industry at New Bedford, Fall River and Providence will go from 88½ cents to 55 cents.

Testing Strength of Cotton Yarns. Explains purpose and nature of the strength test with details of carrying it out. Gives method of calculating for skein and single-strand tests. Suggestions for carrying out tests. *Cotton*, 5-22, 3000 w. APS.

Kier Boiling Cotton Goods. Most of available cotton is dark and difficult to bleach. To overcome shortage of high-grade cotton, progressive bleacher must continually seek to improve his methods. First steps toward such improvement consists in eliminating faulty practices, few of which are mentioned and substitute therefore the procedure which has proven correct both in theory and practice. F. J. WALL, *Textile Colorist*, 6-22, 1200 w. CJW.

Ribbons and Carbon Paper. Ribbon fabric made from long staple Sea Island or Egyptian cotton very closely woven. Ink applied to fabric by means of padding machines, using steel or soft rubber rolls. Inks are dry colors ground in oil, several days being required. Colors used are given. Carbon paper inks are essential mixtures of wax, color and oil. After mixing, remelted and applied hot to tissue in coating machine which regulates and equalizes an amount of ink applied. Then passes over rolls kept cold by cold water which suddenly chills and sets the ink on tissue. P. J. HASSET, *Am. Dyestuff Reporter*, 6-5-22, 1000 w. CJW.

Stripping and Dyeing Shoddy. Colored rags treated with dilute oil of vitriol, squeezed and baked, which destroys linen and cotton threads and fragments. Then passed through willow and finally stripped. Brief description of bichromate of potash and oxalic acid process and also hydrosulphite stripping. Desirable that woolen garments should not be stripped. In redyeing garments that have been stripped are first thoroughly washed of stripping solution and preferably dyed in rotating machines. Choice of dyes restricted to "unions," which will always give best results provided sufficient time is allowed for dye to go on wool at higher temperature necessary for that fiber, and allowed to cover cotton in cooling bath. L. J. MATOS, *Cleaning and Dyeing World*, 5-22, 1500 w. CJW.

Reclaimed Fibers. Cotton and wool substitutes procured from remanufactured or reclaimed classes of fibers. Remanufactured fibers include shoddy, mungo, noils and flocks. Shoddy originates from soft rags, tailors' clipping, blanket cuttings and kindred stock. Waste of knit goods also utilized in shoddy lots. Mungo is result of grinding into soft, fibrous condition, old rags, waste of knitting mills, clippings from clothing manufacturing, soiled rags, gummed rags and rags not suitable for making shoddy. Noils not all inferior fiber; are commonly short, curly and uniform. Flocks chiefly made from droppings from beneath shearing machinery. Flocks used in fulling mill where they are pounded into texture of woven fabric, increasing its weight and stability. *Southern Textile Bul.*, 5-28-22, 1800 w. HHH.

Woolen and Worsted Cloth Finishing. Methods employed in drying textile fabrics after scouring or washing off, should receive consideration from viewpoint of utility, economy and production. Wringers or squeezers frequently used for removal of moisture. Double squeezer effective for woolen goods, of heavy type, but for worsted fabrics single squeezer should be used. In dealing with worsted fabrics pressure needs to be reduced as compared with that permissible for woolens; should never be used on crossbred worsteds. Hydro extractors also employed for removal of moisture. *Textile American*, 5-22, 2000 w. HHH.

French Worsted Spinning. Each type spinning machine has own method of yarn winding. By applying same laws by means of different mechanical arrangements same result is reached in both cases. Mule winds intermittently each draw of yarn spun, spinning frames wind yarn as fast as spun, spinning and winding being continuous and simultaneous. LEON FAUX, *Textiles*, 5-22, 800 w. MBB.

Dyeing Worsted Piece Fabrics. Most important operation is in scouring. This requires use of good and practically odorless soap, sufficient volume of scour liquor and more or less close regulation of temperature and time. Thorough rinsing also necessary. Advantage to wash fine goods after carbonizing and before dyeing. Dyer should be informed of changes in manufacturer's cloth stock. Dyes should be brought into complete solution before adding to bath. Working suggestions for variety of shades given. L. J. MATOS, *Am. Dyestuff Reporter*, 5-22-22, 1200 w. CJW.

Homespuns. Great variety of effects obtainable. Wools used in blending should be dyed with colors fast to milling and washing. Wool to be bleached should be well scoured and evenly wet out, immersed in bath of permanganate, then in bisulphite and sulphuric acid. Dyestuffs recommended. Good grade of wool oil should be used to eliminate too harsh scouring. Palm or olive oil soap give good results. After washing, extract, dry, steam, shear fairly close on both sides with raising and laying-on brush both in use. G. E. TEMPLETON, *Am. Dyestuff Reporter*, 6-5-22, 750 w. CJW.

Naming and Numbering Yarn. Yarns in factory should be properly distinguished, both in color, counts and qualities. Best system is to have only one number for each color throughout all qualities and different count number for each quality. By having one number for each color, those who deal with yarn get to know color easily and so are less likely to make mistakes. By having different count for each quality danger of using saxony for cheviot or vice versa is reduced to minimum. If two or more qualities or makes of yarn are required in same counts, they are differentiated by fractions. In this way yarn is fully described by its number and its counts. Thus: 600, 28 cuts; 600, 28, ¼ cuts; 600, 28, ½ cuts indicate same color in three different qualities or makes. In all cases, spinner would understand fractions are for purposes of identification, integers only being counts. THOMAS WALSH, *Textile American*, 5-22, 1500 w. HHH.

Shady Piece Goods. Source of trouble rather hard to locate. Writer traces worsted piece through various processes, crabbing, steaming, fulling, washing, dyeing, and drying, and considers results which could occur in form of shadedness later, if particular process were not carried on in a manner to obtain proper results. L. N. FUTNAM, *Am. Dyestuff Reporter*, 5-8-22, 1200 w. CJW.

Cause of Nibs or Lousiness in Dyed Silks. Micrographic study of dots and nibs in dyed silks reveals that channeling is due to extremely thin fibrillæ of sericin contained in the fibroin. Lousiness also caused by silk with low cohesion. This cohesion affected by quality of cocoons and district from which they come. Following conditions affect cohesion:

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WHAT'S WHAT IN THE LABOR MOVEMENT, *by Waldo R. Browne.*

A comprehensive dictionary of labor terms. It deserves a place on the desk of every executive who wants to know the meaning of the terms commonly used in the daily papers and in the various magazines which touch upon labor and economic subjects. Waldo R. Browne. 578 pp. $4.00, postpaid.

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This is a popular presentation of the whole budget proposition. It should be interesting to executives who are concerned with savings plans for employees. Contains a suggestive bibliography of literature on the budget question. 174 pp. 1921. $1.75, postpaid.

THE INTERNATIONAL PROTECTION OF LABOR, *by Bontell E. Lowe.*

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How workmen in shops, factories, etc., may be induced to take an active interest in their work; the relation of employer and employee in shops. 152 pp. $1.50, postpaid.

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A review and commentary on labor movements, aims and problems in the United States. 320 pp. $3.50, postpaid.

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temperature of water, speed of reeling, cross or croisure made during spinning, cleanness of water, mineral salts in water. Silk stored for long time in dry place will have low cohesion. Nibs are only defect made by worm; all other defects, such as raw knots, slugs, bad throws, corkscrews, large knots and loops are made during spinning operations. Dyeing operation must be so carried on as to develop these defects as little as possible. Boiling off must be done very carefully, skeins handled as little as possible. I. C. Lewis, *Silk*, 5-22, 1200 w. HHH.

Construction of Weaves. Double cloths can be made with third set of threads which may lie loose between back and face or used to stitch face and back fabrics together. Double cloths can be weighted by third set of threads lying under regular set in either warp or filling. If double fabric, extra heavy, both stitching and stuffing threads can be inserted. Wraps with extra stitching or stuffing threads should be reeded to bring these in dent with regular threads on each side. *Textiles*, 5-22, 600 w. MBB.

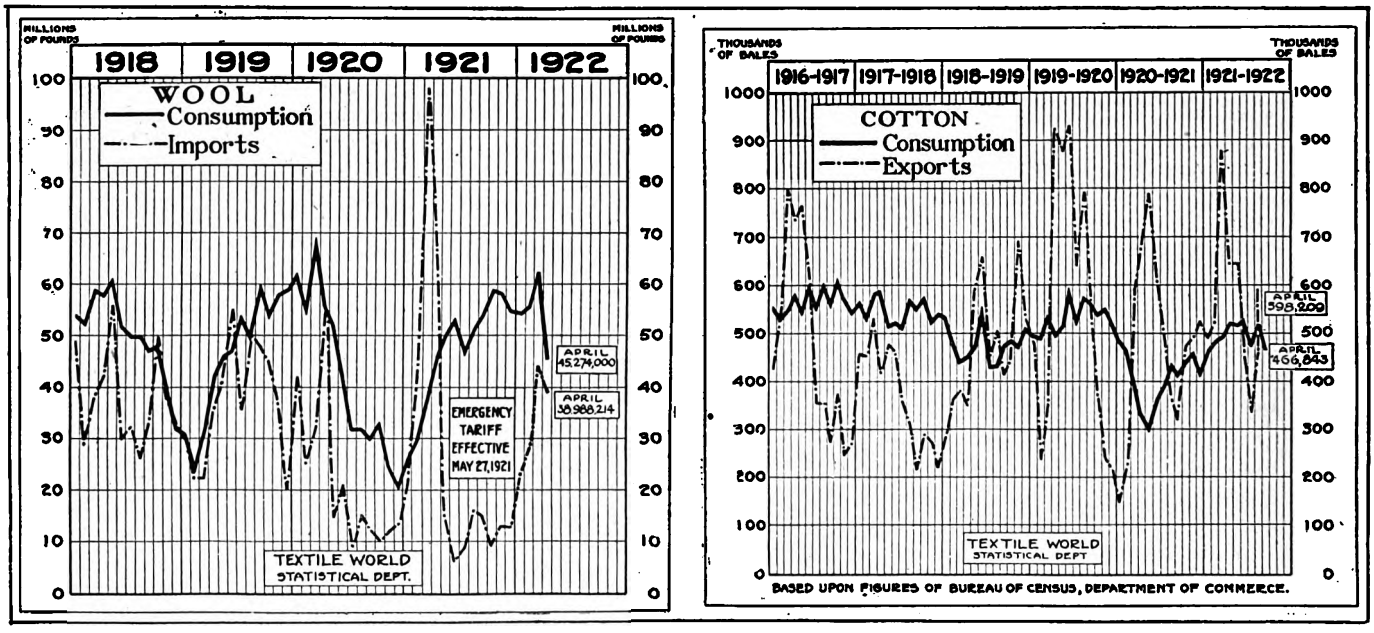
90° F, using 20 gal. per 100 lbs. of wool. Let this saponify for 10 min. or so, then open sud box and let dirty emulsion away to drain. When machine is empty, add alkali as before, about 5 gals. per 100 lbs. of wool, run for 20 min. or so, and wash down. Warm water used at first and slowly, then stronger and colder. Directions also given for fancy worsteds scour and for "low-grade" scour. J. Schofield, *Am. Dyestuff Reporter*, 5-8-22, 2000 w. CJW.

Popular Textile Chemistry. This article covers chloride of lime and chlorine bleaching chemicals. James A. Branegan, *Cotton*, 4-22, 2800 w. To be continued. WRR.

Proper Use of Wood in Connection with Dyehouses and Bleacheries. In roof deck it is necessary to prevent penetration too far of moist air coming up from below. Thickness of roof deck must be such that temperature of sheeting will point out where moist air of room would yield a condensation. Exclusive of sheeting put on under surface of moisture-proof sheeting, roof deck must not be made thinner. Outside temperature requires consideration. Permissible minimum temperature just under deck must be fixed. Prepared wood is perhaps cheapest material for use in top part of deck to prevent moisture insulator beneath from getting too cool. An inferior grade of lumber may be treated and made acceptable, creosoted wood of common variety all right, should be one inch thick; preservative may be applied on spot or wood bought ready treated. (*Cont'd.*) Joseph Woodman, *Textile Colorist*, 5-22, 2000 w. MBB.

considerable trouble. Important to have sufficient sulphide of sodium and soda ash in dyeing with sulphur dyes, especially with light tints. This is necessary in order to hold first small additions of dye in solution and prevent any tendency for it to be precipitated on yarn. Dyes of poor solubility are very apt to cause streaky dyeing in beam dyeing machines. W. F. Haskell, *Am. Dyestuff Reporter*, 5-8-22, 750 w. CJW.

Maintenance of Textile Machinery. Textile machinery is discussed from a maintenance and depreciation standpoint. The author points out the advantages of ball bearings as reducers of friction and thus of power needed to run, also of proper lubrication. He calls attention to the methods of automobile makers who specify that certain designated parts must be lubricated every 500 miles, others every 1000 miles, and so on, and suggests the quality of lubricant as well; he feels that a similar condition may work out in time within the textile and other machinery fields. Some common abuses are mentioned, and easy methods of correcting them. Edwin H. Marble, *Mechanical Eng.*, 5-22, 2800 w. MAH.



Review of wool consumption and imports, and cotton consumption and exports.—*(Textile World.)*

Knitting Double Fabrics. Circular machine joins two fabrics by stitching them at intervals. Machine has two sets of needles, cylinder and dial, two or more feeders, some supplying yarn to dial, others to cylinder needles. Sets work independently of each other, producing separate webs; additional yarn introduced, interlaces with loops of two webs, tying them together. *Textiles*, 5-22, 700 w. MBB.

Scouring and Milling. Three types of scouring: Solvent scouring, in which fats and oils are extracted from fiber by direct solvent action; saponification scouring, in which free fatty acids are converted into soaps; emulsification scouring, in which greasy dirt is removed mechanically by formation of frothy lather or emulsion. In saponification scouring, 3 stages: Run in soda ash solution of 5 to 6° Tw. at about

Uneven Warp Dyeing. Caused by some mechanical failure or error of judgment in use of dyestuffs and chemicals or by simple carelessness. Dark places caused by interruption of progress of warp through dye-bath are apt to become scattered through large lot of yarn in processes subsequent to dyeing and cause

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How America's Leading Men Safeguard Their Health

By Frank G. Soule



FRANK G. SOULE

HOW many times have you picked up your morning paper and read something like this:

"Mr. John Smith, the well-known merchant, was stricken last night in his home with an acute attack of ———. He died before medical aid could reach him. Mr. Smith's sudden and untimely death will come as a profound shock and tragic surprise to the entire community as he *apparently had been in the best of health!*"

Mr. Smith's "sudden" and appalling death got into the papers because of his prominence. But for every Mr. Smith there are thousands of men and women stricken, and snatched away in the prime of life, people whose "sudden" deaths are not of enough importance as "news" to be recorded.

And Mr. Smith *apparently had been in the best of health!* But as a matter of fact his death was not "sudden." Like hundreds of men in your very community are doing today, *he had been dying for years without knowing it.* Had he taken the same precautions with his precious human machine that America's leading men now take with theirs, he might have been spared for many years of healthful, vigorous life.

For it is true that always, for months, even years, there are unmistakable indications in every person's system which shows definitely and conclusively exactly what is wrong. But the pity of it is that the diseases which cause these "sudden" deaths in the prime of life, diseases that often carry off little children, almost in the twinkling of an eye, are so insidious in their attack that there is no outward symptom of their presence until the victim has passed beyond all hope of recovery. In fact, an alarming feature of these diseases is that the very poisons in the blood which cause such "sudden death" often give a fictitious stimulation which gives the victim all the appearance of good health; rosy cheeks, bright eyes and unusual energy. Yet all the time the body may be slowly but surely breaking down under the vicious influence of these unseen poisons.

Because there are 600,000 deaths in the United States each year from preventable diseases—because there are 3,000,000 people sick all the time, most of them needlessly so—because many of these insidious diseases stimulate a fancied feeling of good health and energy—because there are no outward signs which show that the system is slowly getting to the point where "sudden death" is likely: It is for these reasons that America's big men have demanded some kind of efficient protection against the lightning-like death that strikes everywhere, everyday.

Fortunately there is a way to know when this unseen and unfelt disintegration has started, and there are many simple ways of checking the progress of the diseases and restoring the patient to perfect health. Science can warn you of approaching danger, protect you and your loved ones from these diseases and add, perhaps from ten to twenty years to your normal life span.

It is by the use of these scientific measures that America's Leading Men: such men as Wm. Wrigley, Jr., Carl Laemmle, President of the Universal Film Company, George Ade, the Famous Humorist, Chick Evans, the Golfer, Paul A. Harris, the founder of the Rotary idea, Justice O. N. Carter of the Illinois Supreme Court and thousands of other men at the heads of their professions—brokers, lawyers, judges, doctors, preachers, manufacturers, builders, contractors, publishers, editors and writers—protect themselves against, and have ample warning to ward off the slow disintegration caused by sedentary living, lack of exercise and high pressure brain work. These men—every ninety days—without leaving their offices and without spending more than four minutes each year, obtain the most thorough and complete anlysis of their physical condition ever made and receive a detailed report showing exactly what may be wrong. In addition they receive a sheet of helpful suggestions for correcting the trouble and warding off the disease that might otherwise strike death into their midst, deprive their businesses of their guidance, their friends of their association and their loved ones of their protection.

A few years ago, such a service as this—by virtue of its cost and inconvenience—was out of the reach of most men. Only moneyed men could afford to undergo, at the hands of specialists, an examination which showed the exact condition of their bodies. But now, thanks to the corps of trained Scientists and specialists maintained by the National Bureau of Analysis this service has been put within the reach of every man and every woman and made available for every child at a cost which is insignificant when compared with the value of human life.

Send for Free Book on Health

Remember that personal appearance and a feeling of well-being are not always an indication of good health. Instead, the very feeling of good health and energy which you have today may presage a breakdown, possibly a long illness—possibly "sudden" death.



WILLIAM WRIGLEY, JR., president of the company which bears his name, is one of the hundreds of leading American business and professional men who safeguarded themselves against serious illness and "sudden" death.

Do not live in a fool's paradise of fancied good health. Accept the friendly warning of an unbiased and unprejudiced organization such as the National Bureau of Analysis and find out at once what is really happening to your body, unknown to you. Send at once for our brochure entitled, "Why People Die Too Young." It will not obligate you in any way. No solicitors will bother you. You will not be urged to subscribe to the Bureau's Service. But with this booklet in hand you will be better able to tell exactly whether you need such a life-saving service as the Bureau offers and exactly what it can do for you. Show the brochure to your physician if you like. Get his opinion. Then even if you do not subscribe, the knowledge gained from a reading of this valuable treatise will be of inestimable value to you. Simply fill in and mail this coupon today.

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SUGAR-CONFECTIONERY

Sugar Prices Will Not Rise

THE fact that a considerable surplus of sugar will be available for use in this country until the end of the year indicates that prices will remain at or near present levels, says *Fountain Profits*. This prediction is based on a survey recently conducted by the Federal Sugar Refining Company. According to itemized estimates of stocks, consumption and production, there will be 1,246,047 tons of sugar in excess of our needs in this country and in Cuba on Oct. 1 and on Jan. 1, 1923, there will be 1,396,947 tons of surplus sugar here and in Cuba. A total of 4,171,947 tons of refined sugar will be available before the new domestic crops come to market. The raw sugar aggregate is estimated to be 4,163,383 tons. Allowing 625,000 tons for exports from Cuba or the United States during the rest of the year, the balance available for domestic requirements is 3,546,947 tons. Placing the consumption for the last quarter of the year at 950,000 tons, the carryover on Jan. 1, 1923, should be, conservatively estimated, 1,396,947 tons.

It is estimated that Cuba's crop this year will amount to 3,580,571 tons. The yield of sugar is unusually high, many centrals reporting as high as 14% in some of their runs. Moreover, Europe's sugar industry is regaining its pre-war production. Preparations are now being made for the next crop, and it is expected that France will have more than its last crop of 300,000 tons and Germany will exceed its last output of 1,320,000 tons. English refiners are making vigorous efforts to reach their maximum capacity, and this competition is likely to affect American refined sugar.

Java Sugar Industry. Description of the industry and some of the chief factors which have made it a success. *Sugar*, 4-22. WRR.

Sugar-Beet Culture (continued). This number covers irrigation and alkali—elements of plant growth and effect of fertilizer, crop rotation. C. O. Townsend, *Sugar*, 4-22, 6000 w. WRR.

Invert Sugar. Although it is commonly believed that sugar may be conserved by inverting it, it is shown that if sucrose is assigned sweeting value of 100, sweeting value of invert sugar is only 85. Since 100 units of sucrose become 105 units of invert sugar, net loss in sweetening power by inversion is about 11 units. Invert sugar may be of advantage in some places because it does not crystallize so easily as ordinary sugar sirups. Invert sugar sirup prepared practically devoid of flavor, provided less acid is employed. 0.013% by weight of C. P. hydrochloric acid (37%) based on weight of sugar and water taken is recommended. Boiling for 20 min. with this amount of acid will be sufficient to invert practically all of sucrose present. 0.021% of tartaric acid for 40 min. inverted 96% of sucrose. These sirups gave slightly harsh sensation which, however, was not produced by finished beverage. Invert sugar sirup prepared with invertase and concentrated was practically colorless, possessed only slight candy flavor and was remarkably smooth when taken in mouth. Superior to sirups prepared by acids. These make satisfactory bottled sodas. Those made by usual formulas do not make first-class lemon sodas, orange sodas, or other delicately flavored products. J. W. Sale and W. W. Skinner, *J. Ind. Eng. Chem.*, 6-22, 4000 w. CJW.

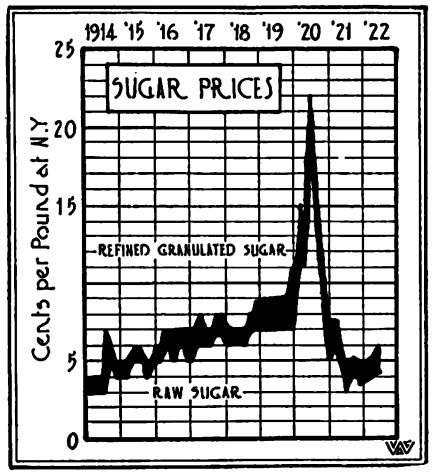
Each acre of walnut trees in bearing will produce every year food approximating 2,500 pounds of beef.—*The North Woods.*

There are 261,553 women farmers in the United States.—*Tractor World.*

Sugar Substitutes. Lactose; maltose; glucose; levulose; derivatives of coal tar. Last prohibited in U. S.—*Confectioners Gazette*, 4-22 500 w. WRR.

Ice Cream Mixes Standardization. Gives practical methods, with tables, of making standard mixes. Benjamin Masurovsky, *Ice Cream Trade Jour.*, 4-22, 1800 w. WRR.

Food Flavors. General discussion of origin and preparation of aromatic substances, oleo-resins, essential oils, terpeneless essential oils, and emulsions,



Sugar Prices in the U. S., 1914-1922.—*(Magazine of Wall Street.)*

and extracts or tinctures. Then follows special discussion of allspice, almond, amber, ambergris, angelica, anise and spike lavender oil. To be continued. J. W. Sale and W. W. Skinner, *Candy Mfr.*, 5-22, 1800 w. CJW.

Coating of Compressed Tablets. First step, removal of dust edges and by revolving coating basin for 5 minutes. Syrup and gelatin solution then added in quantity to cover tablets, and various coating powders added. Usually five treatments are applied one hour apart. Discusses massing tendency, weather conditions, drying, moist tablets, potato starch, and coating tablets of different sizes at same time and separation of same. E. C. White, *J. Am. Pharm. Assoc.*, 5-22, 5000 w. CJW.

Powdered Milk. Powdered milk has no bacteria action when properly packed and kept, and, containing no bacteria, is purest form of milk obtainable. It will keep indefinitely, permits of constant supply of milk at all times, saves freight and express bills, allows uniform mix in manufacture of ice cream. Lack of milk solids, not fat, produces ice cream of large grain and has tendency to be icy. Over amount produces cream that, when hardened, breaks with cleavage of dry putty, while super-amount produces cream salvy and soggy in consistency. N. C. Hoag, *Ice Cream Trade J.*, 5-22, 1200 w. CJW.

Carbonated Beverages. States that advertising appeal has not made proper impression—still considered as a luxury. *Soda Dispenser*, 3-22, 1100 w. WRR.

How and Why of Candy-Making. First of 12 articles, this instalment dealing with cream centers. Author tells of original centers and their disadvantages, development of the industry and its influences, chemical difference between cast and hand rolled centers, attempts to solve problem of fermentation, first use of invert sugar as the remedy, what happens inside centers after they are cast or rolled, machinery for forming hand rolls, how fondant should be used, methods of coating centers. Matthew Berman, *Candy Factory*, 7-22, 3000 w. WRB.

Sanitary Control of Ice Cream. Author reviews control efforts. Instances of early investigations showing that majority of plants were so constructed as to contribute to excessive bacteria in finished product. Since then general improvement has been noted. Milk products are chief causes of bacteria in ice cream, and gelatine may add materially to number present. Manufacturing, handling and selling equipment are other sources of contamination. Softening and then rehardening results in significant increase of bacteria. Temperature should be constant. Prof. James O. Jordan, *Ice Cream Trade J.*, 6-22, 3000 w. WRB.

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Railroad Equipment Purchases Show Increase

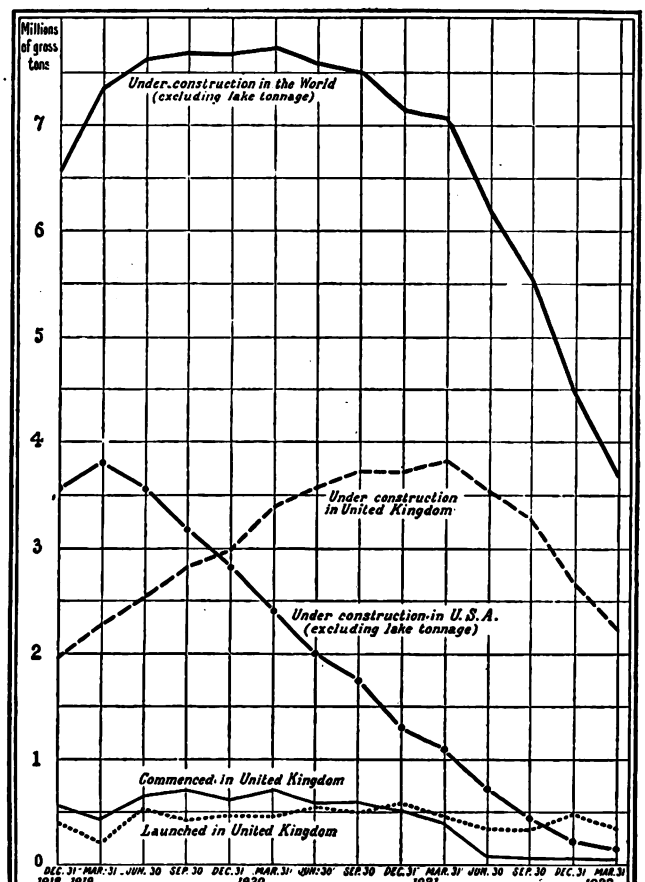
THE marked improvement in business and the expectation of further expansion is reflected in the heavier movement in traffic and the increased activity on the part of railway equipment concerns.

According to the latest available reports, railway executives estimate that freight cars ordered in this country totaled approximately 80,000, or about three times the number purchased in the twelve months of 1921. It is expected that before the end of June approximately 95,000 new freight cars will have been ordered in the first half of the year, or at an annual rate of 190,000 cars. The following table, compiled by railroad statisticians, shows the freight car production for the last 20 years and reflects the fluctuating demands of industry throughout that period:

	Domestic	Foreign	Total		Domestic	Foreign	Total
*1922...	79,550	456	80,000	1911...	133,117	....	133,117
1921...	23,346	5,012	28,358	1910...	141,025	....	141,025
1920...	84,207	21,462	105,669	1909...	189,360	....	189,360
1919...	25,899	3,994	29,893	1908...	62,669	....	62,669
1918...	123,770	53,547	177,317	1907...	151,711	....	151,711
1917...	79,367	53,194	132,558	1906...	310,315	....	310,315
1916...	170,054	35,314	205,368	1905...	341,315	....	341,315
1915...	109,792	18,222	122,014	1904...	136,561	....	136,561
1914...	80,264	....	80,264	1903...	108,936	....	108,936
1913...	146,732	....	146,732	1902...	195,248	....	195,248
1912...	234,758	....	234,758	1901...	193,439	....	193,439

*To June 4.

Self-Propelled Cars on Steam Railways. Largely a technical description of the motor car just purchased and put into operation by the Greater Winnipeg Water District Commission, over its railway from St. Boniface, Man., to Shoal Lake, adjoining Lake of the Woods, a distance of 92 miles. The car is 42 ft. 6 in. overall, and weighs 13 tons. It is powered with a four-cylinder motor. Seating capacity totals 38, plus 8 in the baggage compartment on folding seats. In addition, article describes in similar detail storage battery car of the Canadian National Railways, which is being operated between Bathurst and Campbellton—63 miles. *Can. Railway & Marine World*, 5-22, 4000 w. MAH.



(Manchester Guardian Commercial)

Number and gross tonnage of vessels under construction in the world (excluding lake tonnage) since the quarter ended Dec. 31, 1918.

Quarter Ended	Number	Gross Tonnage
1918		
December 31	2,038	6,566,206
1919		
March 31	2,313	7,349,131
June 30	2,366	7,627,528
September 30 ...	2,179	7,685,715
December 31	2,067	7,680,663
1920		
March 31	2,128	7,727,257
June 30	2,147	7,584,812
September 30 ...	2,086	7,507,614
December 31	1,970	7,157,480
1921		
March 31	1,001	7,067,335
June 30	1,636	6,192,585
September 30 ...	1,475	5,542,978
December 31	1,125	4,456,943
1922		
March 31	954	3,677,622

New Interlocking R. R. System. Large electro-pneumatic plant at Phillipsburg, N. J., uses new operating mechanisms and lead-covered cables. Detailed description of various parts of the installation is given. F. W. BENDER, *Railway Signal Eng.*, 5-22, 3500 w. IG.

Operation of an Electrified Terminal. Detailed description of the operation of the Broad Street Terminal of the Pennsylvania Railroad in Philadelphia. Comparison is made with steam operation. L. E. LYNDE, *Electric Traction*, 5-22, 2500 w. IG.

Handling Finished Product. Standard types of equipment listed below. Discussed in future articles. Class 1. Handling equipment for finished products in bulk or unpacked form: (*a*) Flat belt conveyors, (*b*) Troughed belt conveyors, (*c*) Bucket elevators—various types, (*d*) Screw conveyors, (*e*) Apron and pan conveyors, (*f*) Slat conveyors, (*g*) Scraper and flight conveyors, (*h*) Drag chain conveyors, (*i*) V-bucket and pivoted bucket elevator conveyors, (*j*) Cranes, hoists and monorails, (*k*) Storage-battery or gasoline-motor driven industrial trucks and tractors, (*l*) Lift trucks—hand or power propelled, (*m*) Compressed air conveyors, (*n*) Pumps—all types, (*o*) Industrial railways.

Class 2. Handling equipment for finished products in various kinds of containers, or on platforms or palettes: (*a*) Gravity roller conveyors, (*b*) Spiral chutes, (*c*) Straight slides, (*d*) Apron conveyors, (*e*) Slat conveyors, (*f*) Bar conveyors, (*g*) Chain conveyors, (*h*) Flat belt conveyors, (*i*) Inclined package or barrel elevators—bar, slat or apron type, (*j*) Vertical package elevators and lowerators, (*k*) Storage-battery or gasoline-motor driven industrial trucks and tractors, (*l*) Lift trucks—hand and power propelled, (*m*) Tiering machines — self-propelled and hand-propelled, (*n*) Cranes, hoists and monorails, (*o*) Industrial railways.

Class 3. Automatic machines which handle product in such operations as cutting, filling, wrapping and packing vary with every case and are impossible to name. They are generally the result of design growing out of special studies and experiments with particular product and process to which they are to be adapted. G. L. MONTGOMERY, *Chem. Met. Eng.*, 5-3-22, 2000 w. CJW.

Pneumatic Conveying System for Emptying Fibre Bins. Description of pneumatic conveying system using double fans, operating two-stage blowers, to handle steamy and matted stock. JOHN L. ALDEN, *Heating & Ventilating Mag.*, 5-22, 700 w. CS.

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Muscle Shoals

(*From page 1213*)

men who own farms nearby, and thus put into effect another of his pet ideas. He would operate cheap self-propelled barges on the river—aquatic flivvers. He would build a new Detroit in the South. But, most of all, he would sell cheap fertilizers to the farmers of America, and enable them to grow four ears of corn where one ear grew before.

"I am afraid the idea of this development of Muscle Shoals is being thought of too much in terms of dollars and cents; of manufacturing and profits," said Mr. Ford.

"What I want is for the average man, the small farmer and the wage-earner, to visualize what it means to him. It is no money-making matter to me. I don't want any profit out of it; don't need any more money. It is a great boon to humanity I hope to leave behind me as evidence of my desire and effort to make things better for the people who have not had the fates smile kindly upon them; just the average folks who find things are pretty hard along the pathway of life.

"It means, first of all, that the farm man will benefit most directly. It will mean the saving in labor to him, an increase of production and therefore an increase of return to him.

"Nitrates for fertilizer are merely power arrested by these electrical processes and concentrated or fixed in the form of crystals.

"If the farmer can buy the power now going to waste down the channel of the Tennessee River, floating idly out to sea, put a few pounds of that power under his cotton or corn and realize more return on one acre than he now realizes from four, and obtain that power at one-fourth of what he now pays for nitrate, what has been done?

"He has been saved the labor on three acres of which he got comparatively no return. That same labor expended on four acres with the use of cheap nitrates will increase his productive power in the same ratio, consequently his earning power and his income and his prosperity. It means better homes, more advantages, better education, more comforts and easier life and more happiness.

"The manufacturing wealth of the country is vastly less than the agricultural wealth produced from the laboratory of nature and out of the soil each season. Each farmer is really a producing chemist, and Mr. Edison and I propose to furnish him with raw materials cheaply, conveniently and better.

"The farmer is a manufacturer also, the same as I am, only he is manufacturing the most basic and fundamental necessities of humankind. In spite of his production of the things without which would come famine, want, woe and misery, he has had less help and less before him by science or capital than almost any other class of people in the world.

"There is not a farm in this whole country that will not feel the benefit and the stimulus of this waste power being arrested and fixed in nitrate crystals, again to be transformed into vigorous plants and abundant fruit. It touches every farm in the United States.

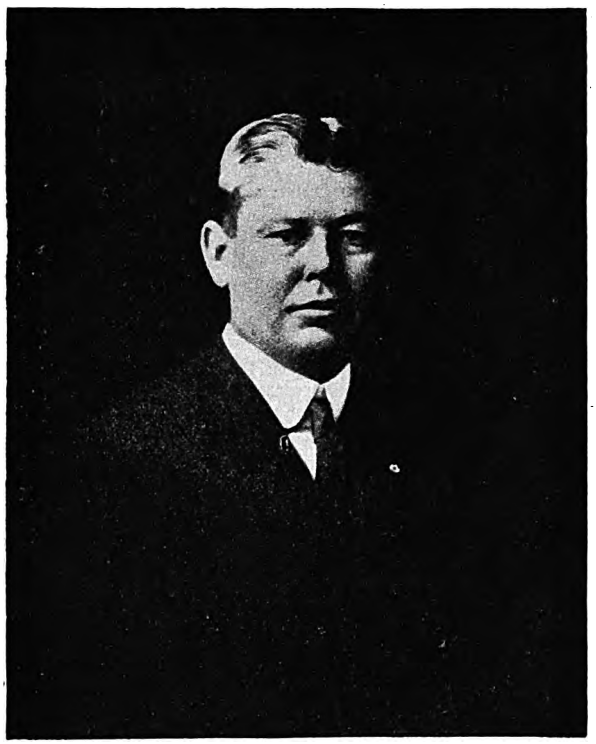
"The widespread basic prosperity will give a firmer foundation for the rest of our people. Say what you please, the farmer is the very ground beam of our national life, and, next to him in usefulness, the worker in other lines who exchanges his strength, skill or knowledge for daily bread.

"The surplus power after supplying the farmers with cheap fertilizer will accord employment for many thousands of people. It will turn many wheels now non-existent. It will create new wealth out of raw materials and effort and skill, and, I hope, with more equitable adjustment of rewards to those concerned than generally exists today.

"It will enable thousands of people to sell their raw materials. It will afford facilities to many additional hundreds to engage in more individual efforts at the production by making power more easy to obtain and use in the small industries and will develop initiative and experiment in pioneering along manufacturing lines.

"It will enable the conservation of our coal resources and the proper utilization of this, our most amazing, potent gift from nature more heavily laden with useful so-called products than any other known substance. In the utilization of this coal as it should be used there will be many more factories and processes affording employment to a huge number of people.

"And all of that as a permanent thing, growing out of what is now a waste. Something not of value at all, but rather a colossal loss to the people every day because the people are not receiving the benefit from it."



H. M. RUBEY

PRESIDENT, THE RUBEY NATL. BANK, GOLDEN, COL.
FORMER PRESIDENT, COLORADO BANKERS ASSOCIATION
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Published in the interest of better business

By **ERNST & ERNST**

What's Wrong With Coal?

(*From page 1201*)

"There is no independent family physician building up a practice by competing with other physicians. There are no local lawyers settling the community's difficulties over property rights, because the ordinary citizen has no property rights and can secure none.

"It is seldom that anyone campaigns for a new school or tries to find a better teacher, because these things are taken care of for him. No group of people ever get together and decide that the old church is too shabby and that they will get a new one. They wait till such things are done for them.

"It is not quite true to say that no one does these things. The coal company does them all. The essential characteristic of a coal-mining civilization, in West Virginia as well as in some other parts of the country, is the extent to which the employer, the company, controls things. It is a paternalistic, in some ways a feudal, civilization.

"Let us take a typical coal-mining plant. In the first place, the company owns practically all of the property. Usually it owns it for a considerable distance around the mine. It owns all of the buildings and the land on which they are erected. It owns the houses, the stores, the movie theatre, the Y. M. C. A. (if there is one), the school, the churches—in a word, the whole town.

"It employs the physician, and collects something each month from every miner to help pay him. It often guarantees the salary of the minister and not infrequently supplements that of the school teacher.

"The company is thus responsible for the welfare of the town. It is the sanitary officer with all his usual functions. It takes care of the roads, provides the lighting, determines the variety of amusements, and sometimes supplies the police protection.

"It can exercise supervision over persons coming into the town and events there. It can keep undesirable people out. It can, if it wants to, even censor the mail, since the Post Office is usually located in its general store and one of its employees is postmaster.

"Moreover, the company does not pay the people of the town as other industrial establishments pay their employees. It does not pay the men all that they earn in cash. Each payday the miner is handed a statement, which shows his total earnings for the period and the amounts he owes the company for various items.

"These items, or 'debits' as they are called, include the amount of his purchases at the company store. They include rent, a fixed charge. They include the lighting of his house, another fixed charge, and fixed charges for fuel, doctor, hospital, and the sharpening of his tools.

"The total amounts owed by him to the company are then subtracted from the total amounts due him, and he receives the remainder in cash. Thus, if he has earned $80 during the fortnight and his debits come to $43, he receives $37 in cash."

From the strictly business point of view, the chief evil to be remedied is the irregularity of production. Some persons, among them Floyd W. Parsons, industrial writer, believe that much can be accomplished to alleviate this evil by providing increased facilities for the storage of coal. In an article in the *Gas Age-Record,* Mr. Parsons discusses this and other remedies as follows:

"Some contend that the cure for the bad conditions lies in the hands of the consumer, who can help greatly by arranging his purchases so that there will be a more regular demand for coal, which will result in a more regular operation of the mines. Others believe that the greater storage of coal is a partial solution of the problem. Then there are those who assert that in order to let demand overtake the present overdevelopment of our coal fields, we must enact legislation which would prohibit railroads from putting in sidings or arranging to serve new mines until after receiving from the Secretary of Commerce, or other prescribed official, a certificate of convenience and necessity similar to that now required by the nation's carriers before they are permitted to make capital expenditures for branch or main-line extensions, including material and equipment for same.

"Some of these suggestions would likely benefit the situation considerably. But all of them fall far short of anything like a complete solution of the problem, while, in addition, each of the suggestions has so many bitter opponents that without strong public support very little is likely to be accomplished in bettering conditions. The public has heard so much about coal remedies that it has grown apathetic and will not be aroused until something bordering on an industrial disaster actually happens. Such has been the history of the coal industry in this country from the very beginning, and there isn't the semblance of a hope that things are about to turn for the better. That we are riding to a fall goes without saying, but just when and where the smash-up will come is a matter of uncertainty.

"Storing coal during the summer months will help a lot. Forcing the miners' union to incorporate, bringing it under corporation and partnership regulatory laws, will also help a lot. The United Mine Workers' organization should be compelled to accept responsibility, and should be made to pay income and excess-profits taxes.

"But, after all is said and done, there are just two real solutions of the coal muddle. First, we must have a bureau of coal economics, an impartial and carefully selected Government committee, authorized to collect and disseminate coal statistics of all kinds. Instead of being a step toward Government control, this is the one and only step that will eventually prevent complete Federal regulation of our mines. Second, we must depend upon engineering skill and scientific knowledge to give increased profits to the owners, a greater annual income to the miners, and to supply fuel at a lower cost to consumers. At the present time, less than 200 pounds, on an average, out of every ton of coal mined, is converted into useful work. The coal industry must follow in the steps of the meat packers, and start to refine coal and save the by-products, even to the last squeal of the article produced. If the people of the country wait for the coal industry to provide a solution of the problem, all they will get from their waiting will be industrial infirmity."

Far more drastic remedies than these have been suggested. Some persons believe that nothing short of Government operation of the mines, or at least close Government supervision, will solve the problem. Others say that the surplus mines of the country should be shut down; but not many persons are ready with practical suggestions as to how this can be done without injustice to the owners of those mines.

The problem of the nature of the work, and of working conditions among employees, is even more difficult to solve. Progressive mining corporations now are doing their best to give their employees the best possible conditions. Others, perhaps, will follow their examples in the future. No one is in a better position to help matters in this way than the operators themselves.

Bucket Shop Losses

(*From page 1207*)

form. Here again a sharp line of demarcation must be drawn between legitimate and illegitimate transactions. The making of contracts for the purpose and sale of securities, when, as and if issued' is, under certain conditions, absolutely proper. To prevent it would represent a financial hardship. The New York Stock Exchange accordingly does permit trading in securities 'when, as and if issued' under circumstances and conditions which the exchange considers proper and legitimate.

"Another point that has recently been made is that Stock Exchange members should be prohibited from speculating on their own account. Here again comes into play the problem of what is legitimate and what is not legitimate.

"The New York Stock Exchange recognizes that no broker may be permitted to speculate for his own account with the money or with the securities of his clients. All the rules of the New York Stock Exchange are intended to prevent any such practice, but there is no reason why a broker should be denied the right to employ his capital for the benefit of the country's development through new enterprises, provided that such employment of his own capital does not jeopardize his customers.

"The Governors of the New York Stock Exchange are constantly studying the possibilities of further reform and improvement in methods. We welcome suggestions from the public. We recognize fully that the Exchange cannot succeed, that it cannot be responsive to the public demands which are made upon it, indeed, that it cannot expect to be immune from drastic and unwise public regulation, unless it lives up to the highest possible standard of its obligations to an enlightened public sentiment."

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The INDUSTRIAL CALENDAR

Secretaries of Associations are invited to send us the dates of their conventions as early as possible so that their conventions may be properly listed below. When especially requested by Association Secretaries, we will send dates and other available notices concerning meetings of other associations.

July 9-12. *International Association, Display Men,* Chicago, Ill. (L. A. Rogers, Secretary, John D. Mabley Co., Detroit, Mich.)

July 10-15. *Export & Import Exposition,* Baltimore, Md. (A. E. MacKinnon, 405 Lexington Ave., New York.)

July 11-13. *Mine Inspectors' Institute of the United States of America,* Chicago Ill. (J. W. Paul, Sec., 4800 Forbes St., Pittsburg, Pa.)

July 12-14. *National Assn. of Stationary Engineers,* Springfield, Mass. (James Morgan, 53 Devonshire St., Boston, Mass.)

July 16. *American Institute of Banking,* Portland, Ore. (R. W. Hill, Secretary, 5 Nassau St., New York.)

July 19-21. *National Assn. of Stationary Engineers,* Kalamazoo, Mich. (A. M. Adams, 1307 Stockbridge Ave., Kalamazoo, Mich.)

July 25-28. *National Retail Tea & Coffee Merchants Assn.,* Hotel Statler, Detroit, Mich. (R. M. Heizer, Secretary, 1201 Cornell Ave., Indianapolis, Ind.)

Aug. 7-11. *Universal Craftsmen Council of Engineers,* Cleveland, O. (Thomas H. Jones, Sec., 33 Linden Ave., Cherrydale, Va.)

Aug. 7-25. *National Merchandise Fair,* Grand Central Palace, New York. (Lew Hahn, Director, 200 Fifth Ave.)

Aug. 23-25. *American Association of Railroad Superintendents,* Kansas City, Mo. (J. Rothschild, 400 Union Station, St. Louis, Mo.)

Aug. 28-Sept. 2. *National Safety Council,* Detroit, Mich. (S. J. Wiliams, Sec., 168 N. Michigan Ave., Chicago, Ill.)

Sept. 4-9. *Gas and Fuel Section of the American Chemical Society,* Pittsburgh, Pa. (Dr. R. S. McBride, Secretary, Colorado Bldg., Washington, D.C.)

Sept. 11-15. *Association of Iron and Steel Electrical Engineers,* Cleveland. (J. F. Kelly, Secretary, Empire Bldg., Pittsburgh.)

Sept. 11-16. *Bakery Equipment and Material Exposition,* Municipal Pier, Chicago, Ill. (B. M. Warner, Secretary, Conway Bldg., Chicago, Ill.)

Sept. 11-16. *National Exposition of Chemical Industries,* Grand Central Palace, New York. (F. W. Payne, Sec., Grand Central Palace, New York.)

Sept. 12-14. *Retail Bakers of America, Chicago.* (J. M. Hartley, Secretary, 10 S. La Salle St., Chicago.)

Sept. 12-15. *American Bakers Assn., Chicago.* (H. E. Barnard, Secretary, 1135 Fulliton Ave., Chicago, Ill.)

Sept. 19-22. *Pacific Coast Gas Assn.,* Santa Barbara, Cal. (W. M. Henderson, Secretary, 445 Sutter St., San Francisco, Cal.)

Sept. 25-29. *National Association Retail Druggists,* Detroit, Mich. (S. C. Henry, Secretary, 168 N. Mich Blvd., Chicago, Ill.)

Sept. 25-30. *National Association Advertising Specialty Mfrs.,* Chicago, Ill. (B. Blackwood, Secretary, 208 S. LaSalle St., Chicago, Ill.)

Oct. *American Electric Railway Association,* Chicago, Ill. (J. W. Welsh, 8 West 40th St., New York.)

Oct. 2-6. *American Bankers Association,* Hotel Commodore, New York. (W. G. Fitzwilson, Secretary, 5 Nassau St., New York City.)

Oct. 2-7. *American Society for Steel Treating, International Steel Convention,* General Motors Bldg., Detroit, Mich. (W. H. Eisenman, Secretary, 4600 Prospect Ave., Cleveland, Ohio.)

Oct. 11. *National Association Electrical Contractors and Dlrs.,* Cincinnati, Ohio. (W. H. Morton, Secretary, 15 W. 37th St., N. Y. C.)

Oct. 11-13. *National Federation of Implement Dealers' Association,* Chicago, Ill. (H. J. Hodge, Secretary, Abilene, Kan.)

Oct. 11-14. *Pacific Coast Logging Congress,* Tacoma, Wash.

Oct. 17-19. *American Railway Bridge and Building Association,* Cincinnati, Ohio. (C. R. Lichty, Chicago & North Western Ry., 219 North Waller Ave., Chicago, Ill.)

Oct. 18-20. *National Association Farm Equipment Mfrs.,* Chicago, Ill.

Oct. 28. *American Gas Association,* Annual Convention, Atlantic City. (Oscar H. Fogg, Secretary, 130 East 15th St., New York City.)

Foreign Events

June to November. *French Colonial Products,* Marseilles, France.

June 24-Sept. 15. *Annual Exhibition of Ceramics and Glassware,* Dresden, Germany.

July. *Second Near East Sample Fair.* New exposition buildings being erected along the Danube.

July 9, *Universal Exhibition,* Buenos Aires, Argentina.

July 24-29. *International Tobacco Trade Exhibition and Conference,* London, England.

Aug. *Second Sample Fair,* Lublyana (Leibach), Yugoslavia.

Aug. 12-20. *Third Annual Sample Fair,* Liberee (Reichenberg), Czechoslovakia.

Aug. 27-Sept. 2. *Autumn Fair,* Leipzig, Germany.

Sept. *International Exposition (centennial),* Rio de Janeiro, Brazil.

Sept. 15. *International Fair,* Bandoeng (Java).

Sept. 18-23. *International Chamber of Commerce,* Rome, Italy.

Sept. 21. *Textile Fair,* Hamburg, Germany.

Sept. 25-Oct. 3. *Automobile Show* at the Kaiserdamm Hall, Berlin, Germany.

Oct. 1-15. *General International,* Lyons.

Oct. 4-15. *Automobile Show,* Grand Palais, Paris, France.

Oct. 12-23. *International Commercial Vehicle Exhibition* at Olympia, London, England.

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Enamel Spot or "Ring Pin." Spot is enamelled on the glass. This and the glass spot pin photograph as a ring.



Enamel Spots can be furnished as a DASH or CROSS if desired.









Triangular or Square Head pins are used where the 16 colors do not furnish sufficient variety. They also help color-blind users. These pins show distinctive shapes when photographed whereas some colors photograph the same.



Spiral Top Pin. Furnished with card in any of the 16 standard colors. Useful where much data must be written out.



Signal Flag. Made of celluloid. One side glossy, one can be written on. Useful for indicating special attention or where a flag is preferred to a pin.















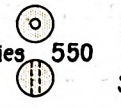
Numbered or Lettered pins made up to order in any of the 16 standard colors. Dark colors with white letters photographed as black circles enclosing the figures. Use size of pin admitting maximum number of figures required. These numbered pins used in sets 1-31 to indicate days of the month. Also alphabet sets A-Z.



Oil Well Pin. Shape resembles oil well derrick. Can be supplied with two-colored head.



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Beads. Uniform in size and color with 3/16" and 3/32" spherical map pins respectively. Can be used with pin to show additional fact or strung on long pins to show accumulation or quantity at one spot.



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Enclosed is $1.00, for which send me a trial assortment of EDEXCO Map Markers, together with U. S. map on an 8½x11-inch piece of EDEXCO Cork Mount.

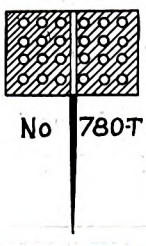
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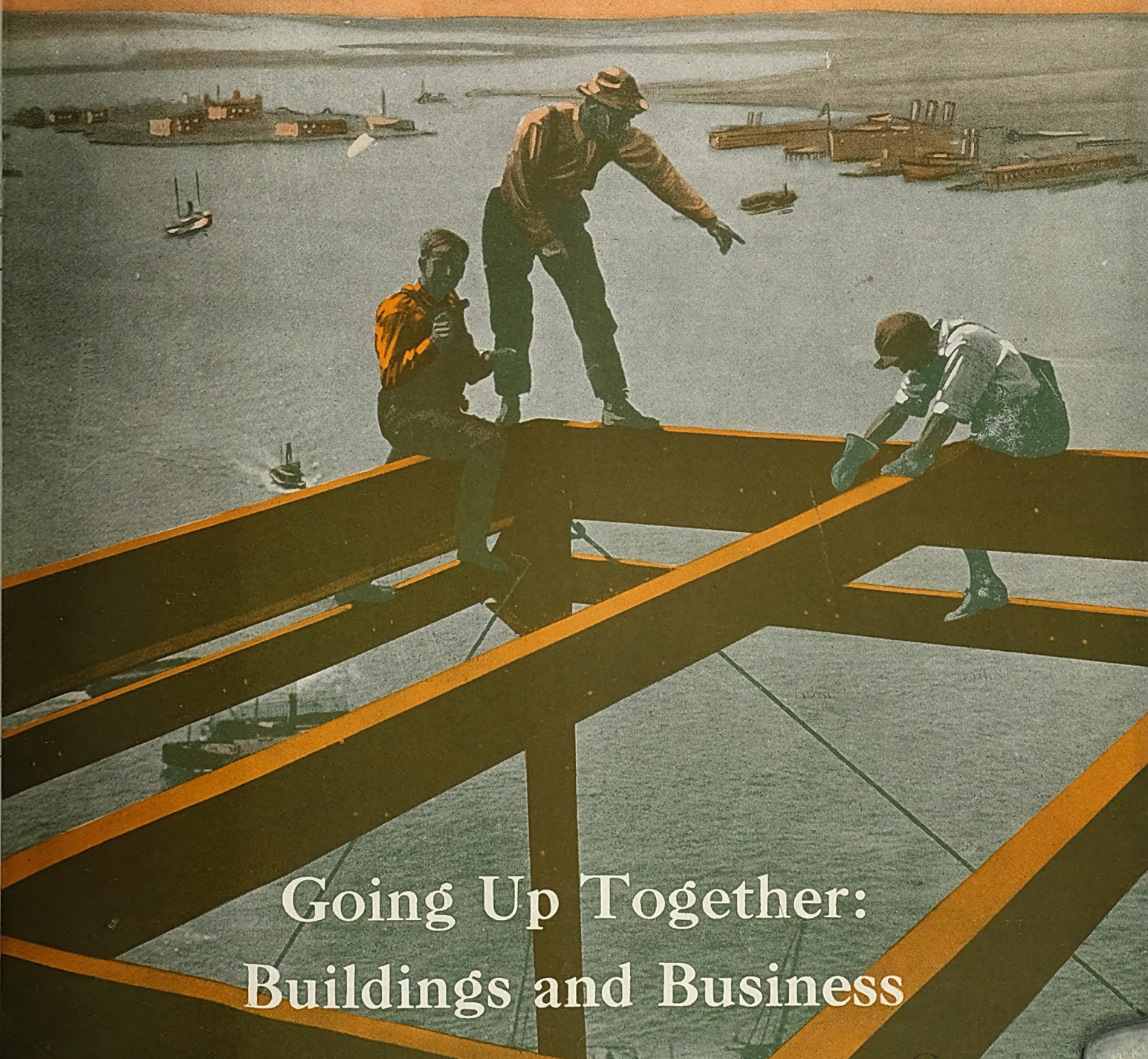


The INDUSTRIAL DIGEST

July 22

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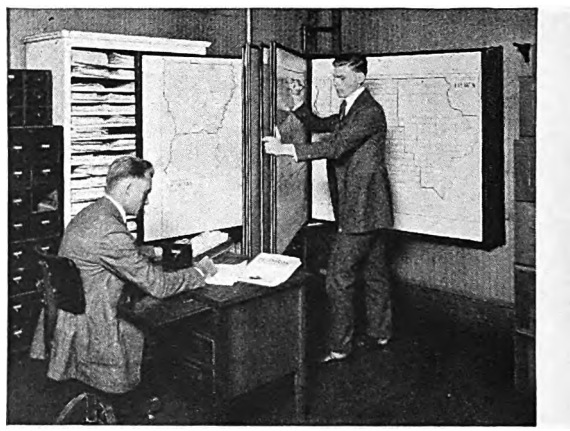
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Small Washable Maps for Multi-Unit or Map Cabinet System

The map systems shown here are the large size Multi-Unit, in which our large business maps are displayed. The wings are 50 x 48 inches. We can also supply smaller maps, size 21 x 28 inches, with complete index on front surface, which are suitable for use either on the smaller size Multi-Unit system (wings 29 x 29 inches) or in map tack cabinets.

With the small size Multi-Unit System, we furnish graphic chart sheets 8 x 27 inches in size, which are mounted on the wings either below or at the side of the map and index. This graphic chart, on the same surface as the map, makes it easy to keep records and supplement the information shown on the maps. The maps are complete and accurate, and have the washable surface.

If you will tell us what territory you cover, we shall be glad to recommend a map system that will give you maximum service. Address Dept. I. D.-7, Murphy Building, Indianapolis.

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THE EDITORS,
Industrial Management.

Methods of production planning, of accounting, and most emphatically of cost determination, perhaps efficient in other days, have now become an inadequate *collection of habits—rut-running habits.*

Can your decisions and policies in meeting present conditions, then, be other than fettered by such habits—these "ghosts of yesterday"?

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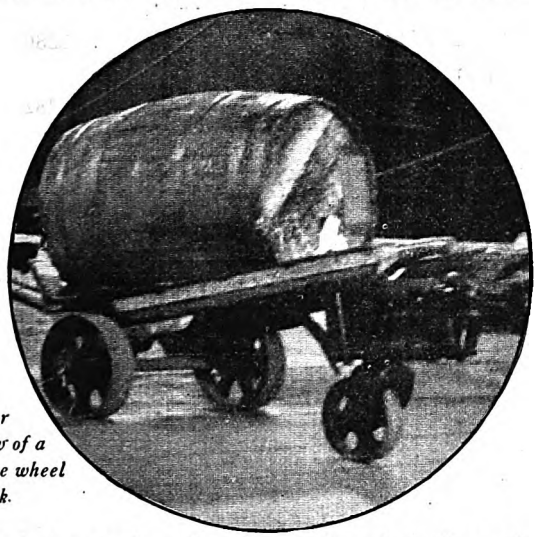
Entered at the New York Post Office as second-class matter on December 24, 1921, under act of March 3, 1879.

Economical Handling of Barrels and Drums

Cedar Hill Terminal of New York, New Haven & Hartford Uses a New Type of Truck Built by Lansing Company and Completely Hyatt Bearing Equipped

For the economical handling of barrels and drums the New York, New Haven & Hartford Railroad is using a new type of three wheel truck evolved by the Lansing Company. This is a two wheel truck with a caster wheel between the handles.

The new three wheel truck is loaded just as any two wheel truck, and is then dropped until the caster wheel rests on the floor. The loaded trucks



Near view of a three wheel truck.

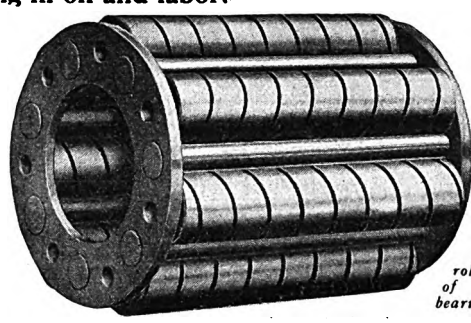
coupled together form a train of trailers that is rapidly hauled by a tractor. Arriving at their destination the trucks are quickly and conveniently unloaded.

The new trucks are equipped throughout with Hyatt roller bearings, making them easy to move either by hand or as trailers and insuring their dependable operation for years without necessity of bearing adjustments or replacements.

Whatever improvements are contemplated in your trucking systems it will pay you to give careful consideration to the bearings. The use of Hyatt roller bearings makes possible material handling at the lowest cost per ton because of their easy running, their lubrication saving and their durability.

The rollers of the Hyatt bearing provide a true rolling motion in place of the rubbing friction of plain bearings, so that one man can handle twice as heavily loaded trucks without extra exertion and tractors can pull more trailers per train

The bearings are enclosed in the wheel hubs, providing a space for lubricant which need be replenished only three or four times a year — a real saving in oil and labor.



The easy rolling element of the Hyatt bearing

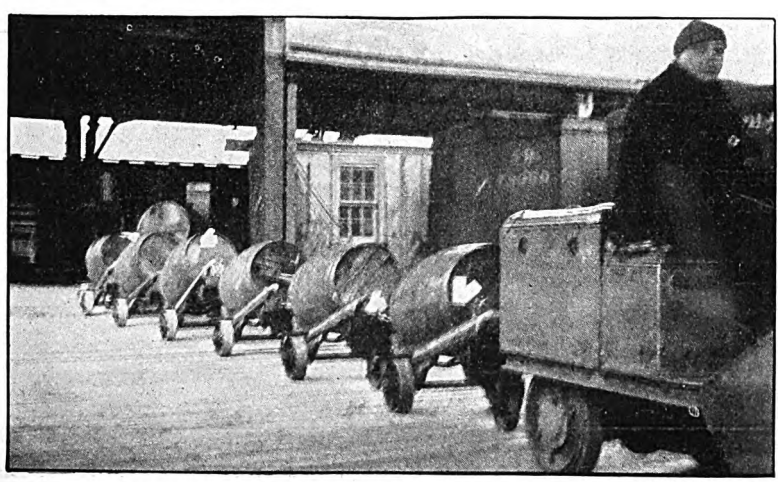
The tough, resilient steel rollers are designed to operate correctly without appreciable wear even after years of hardest service.

Whatever type or make of trucks you are using, these advantages can be secured by specifying that they be Hyatt equipped. Practically all representative truck manufacturers are in a position to furnish their trucks equipped with Hyatt roller bearings.

Hyatt Roller Bearing Co., New York, N.Y.

Industrial Bearings Div., New York
Motor Bearings Div., Detroit
Tractor Bearings Div., Chicago
Pacific Coast Div., San Francisco

USE HYATT BEARINGS ON YOUR LINE SHAFTS TOO BULLETIN 127



This is the way they haul barrels at the Cedar Hill Terminal of the New York, New Haven & Hartford on three wheel trucks equipped with Hyatt roller bearings and made by the Lansing Company.

Of the three factors entering into the cost of any manufactured product—material, labor, and factory overhead—management can exercise the greatest control over factory overhead. In this one factor lies the greatest opportunity for reducing the total cost of goods.

Curiously enough, in some establishments, overhead gets even less attention than labor or material costs. And this burden on the organization frequently proves to be the undertow that drags the figures from the black over to the red side of the ledger.

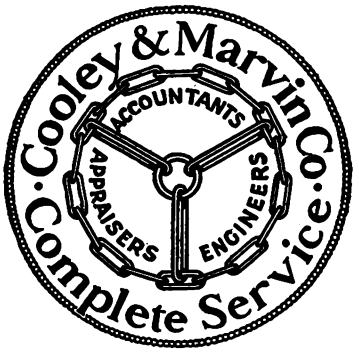
We specialize in charting costs, reorganizing manufacturing plants and improving production methods to the end that overhead may be as low as is consistent with good management.

Would you like to know how we have helped other manufacturers get out of the undertow?

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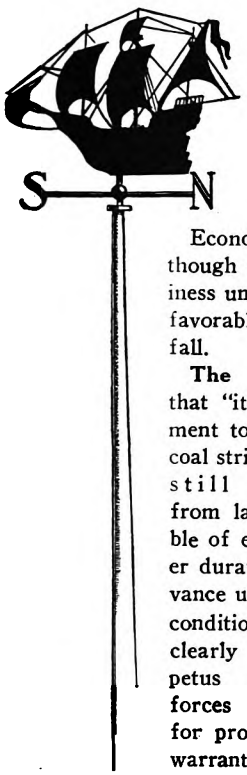


CONWAY BLDG.,
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THE INDVSTRIAL DIGEST

July 22
1922



The Business Weathervane

A Summary of Expert Opinion

Economic observers generally agree that though the summer depression is affecting business unfavorably, fundamental conditions are all favorable to a steady increase in business in the fall.

The Harvard Economic Service believes that "it is noteworthy that the June improvement took place during the third month of the coal strike, and with the northern cotton industry still suffering from labor trouble of even longer duration. Advance under such conditions shows clearly the impetus of the forces making for progress and warrants the expectation of an acceleration of the upward movement when these retarding factors are removed. The continuation of the improvement begun in February corroborates the evidence furnished by easy money and the rise in speculation that the present advance is a major upward movement of the economic cycle.

"Business sentiment at the end of the half-year is becoming more optimistic, despite such adverse influences as labor troubles in the United States and financial disturbances in central Europe. Earlier doubts concerning the improvement shown are giving way to the conviction that a substantial recovery is under way, and only its extent and permanence are called into question. Doubt as to the reality of the improvement is now met by such persuasive evidence as the unprecedented building activity, the return to more normal production in the iron and steel industry, the sustained increase in freight car loadings, the decrease in the number of failures, and the advance in wholesale prices since the beginning of the spring. Such clear signs of improvement have followed, as in the past, the easing of money conditions and advance in speculative activity which were the most conspicuous developments in the first quarter of the year."

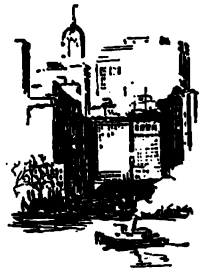


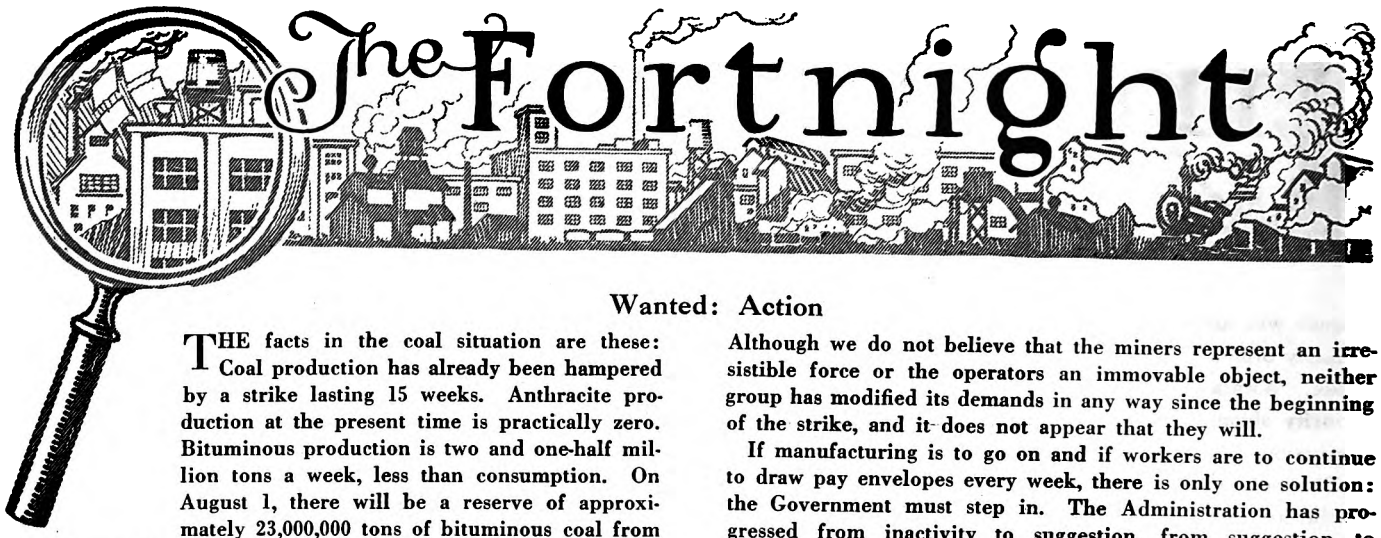
(Indianapolis News)

Beginning to worry him.

J. H. Tregoe, of the **National Credit Men's Association,** believes that the favorable factors are: 1. Economy in the raising of the present year's crops. This economy will be a tremendous help to the farmer and increase his purchasing powers. It is already reflected in increased sales by mail order houses. The agricultural sections are looking up. With the farmer back in the market business will be greatly accelerated and strengthened. 2. The production of basic commodities is on the upward trend despite the strike. The production of pig iron and steel ingots is showing improvement. 3. Railroads are coming into the market. Freight cars ordered up to June 3 total 80,000—three times the number ordered in 1921. If continued at this rate an output of 190,000 freight cars in 1922 is promised. Other equipment is being bought by the railways, making an encouraging factor in the situation. 4. Railway earnings show a little improvement. The gross returns are less than last year, but reduction in operating costs have put the net earnings on the favorable side. 5. Renewed volume of trade is reflected in carloadings and by other indexes. There is a decrease in some lines and in some districts, but on the whole, the volume has increased. 6. Construction is still active as indicated by contracts awarded recently. The figures for May were the largest ever recorded for that month in the country's history. The figures for the first five months of the year are 61% larger than the figures for the same period of 1920. This construction is mostly residential, but business and industrial building is also improving. 7. Unemployment is decreasing. A marked increase of employment is recorded in automobile, paper, car building and repairing. Unemployment is recorded in other lines, but on the whole there is little enforced idleness. 8. A continued improved mental attitude on the part of the people. This is a good indication and helps in our recuperative process.

(Turn to page 1320)





Wanted: Action

THE facts in the coal situation are these: Coal production has already been hampered by a strike lasting 15 weeks. Anthracite production at the present time is practically zero. Bituminous production is two and one-half million tons a week, less than consumption. On August 1, there will be a reserve of approximately 23,000,000 tons of bituminous coal from which must be drawn 10,000,000 tons a month, if consumption is not restricted.

In other words, in less than 10 weeks every industry in the country will be facing empty coal bins. A coal famine actually exists at the present time, and every week of famine is certain to add to the price of coal to manufacturers.

From these facts THE INDUSTRIAL DIGEST draws these conclusions: At whatever cost, the coal strike must be settled unless industrial activity in the United States is to be slowly throttled to death. Such a disaster must not be permitted. There appear to be three alternatives: (1) A peaceful compromise will be effected between the union leaders and the operators. (2) Either the operators will give in or the miners will return to work on terms dictated by the operators. (3) The Government will step in and operate the mines.

For 15 weeks the first alternative has not proved successful. Although we do not believe that the miners represent an irresistible force or the operators an immovable object, neither group has modified its demands in any way since the beginning of the strike, and it does not appear that they will.

If manufacturing is to go on and if workers are to continue to draw pay envelopes every week, there is only one solution: the Government must step in. The Administration has progressed from inactivity to suggestion, from suggestion to requests, from requests to threats — and nothing has been accomplished.

THE INDUSTRIAL DIGEST believes that the time for words has passed. We believe that the country demands action. We ask the Government to take immediate and decisive steps to operate the mines. Operators should be compelled to open their mines and miners should be forced to return to work by injunctions. The terms can be settled just as well after production is resumed as when the mines are idle. We believe that Government action can be hastened by manufacturers if they will get in touch with their Congressmen, point out the importance of a prompt settlement and demand that coal mining be resumed before our factories and mills shut down. We urge our readers to take this step promptly and forcefully in the belief that it will help to correct a situation which is even now threatening the very life of business.

What of the Coal Strike?

PRACTICALLY speaking, there has been no change in the coal situation, although President Harding has requested operators to open their mines, demanding that both State and Federal protection be given to every man willing to work. Observers generally agree that the strike is no nearer a settlement than on April 1. Union labor's attitude is expressed by President Gompers of the American Federation of Labor: "The miners who are on strike are not going to dig coal until the strike is ended. The non-union miners are and have been at work and their number cannot be materially increased. The army may go into the mining districts but the army is not composed of coal miners. The operators' refusal to budge is influenced by the fact that while the reserve supply of coal is dwindling at an alarming rate, prices are beginning to rise and the strike will not affect the amount of coal to be burned, in any event so that the situation does not affect sales. It will be recalled that in the case of the strike during the Roosevelt Administration there was a deadlock of 23 weeks before action was taken. Furthermore the strike was not settled until cold weather had forced public opinion to a general clamor for coal. If the present strike runs into cold weather thousands of manufacturers and factories will be compelled to shut down on account of lack of fuel."



(Philadelphia North American)

A situation bound to develop sooner or later.

Attorney General Daugherty after a Cabinet conference recently made the following statement: "Developments in the rail and coal strikes indicate the existence of a definite relation between the strikers in the two industries. Whether this relation is inspired or conspired, I am not now prepared to say."

Rail Strike Not Likely to Spread

CERTAIN it is that the rail strike is becoming daily of greater assistance to the

in Perspective

miners who are out. Industries that were hard hit by the coal priority orders two years ago are becoming apprehensive once more. With a certain shortage of cars running up in the fall, priority shipments will unquestionably be necessary to avoid confusion.

The rail strike has also reached a dead center. In addition to the 300,000 shop men who went out originally there are now 8,000 stationary firemen and oilers out. Although there has been no official walkout of the 400,000 maintenance-of-way men, reports from all over the country indicate that many of them are leaving their jobs. In addition, labor circles report that the 200,000 railway clerks are voting in such a manner that a strike is inevitable. Every week that the strike lasts will make the freight tie-up in the fall just so much worse. The only possibility that the strike will not spread beyond the 608,000 men now out lies in the recent acceptance by the railroad executive's proposal that employees who are members of other unions shall not be called upon to do work of the striking shopmen. This apparently removes the most immediate source of danger that the strike will spread.

Unions Showing Bold Front

THERE has been too much violence in connection with the rail and coal strikes here according to editors of leading papers.

It might be supposed that under the terms of the Coronado decision rail union executives would be troubled as to the possible damage suits that might be filed. At present there is pending against the strikers for interference with transportation damage claims of over two million dollars.

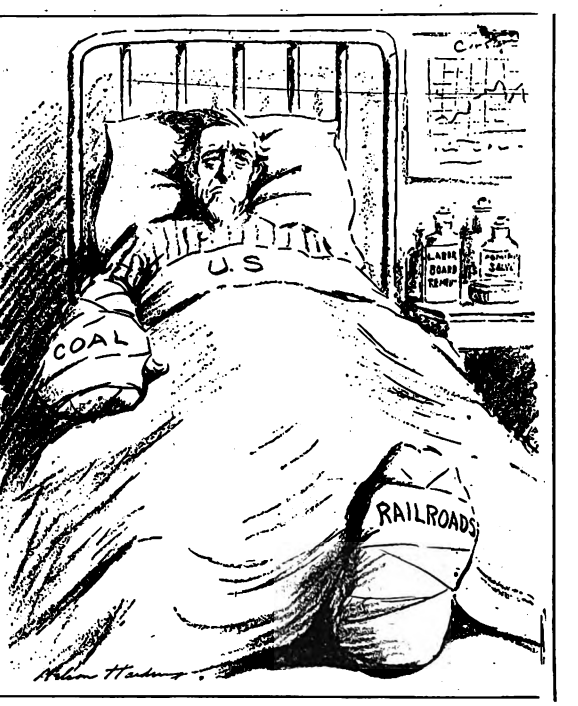
The United Mine Workers of America apparently learned no lesson from the Herrin massacre since their members again took part in a wholesale murder in West Virginia. Outbreaks on railroads have not been so frequent, but there are widespread reports of damage to property and interference with train schedules. As a matter of fact the rail unions are counting upon the fact that rolling stock is not in good shape in order to win the strike. Bert M. Jewell, president of the Railway Employees Department of the A. F. of L., stated in a recent speech to strikers: "The economic condition of the country is on our side. Time is fighting for us. The demand for freight traffic is increasing steadily all over the country. The railroads realize that there must be a tremendous coal traffic before December in order to supply domestic and industrial needs of the country. On June 15, 14.6% of the freight cars of the country were in bad order. This is more than twice the normal percentage. Locomotives on most roads are also in bad condition."

The effect of such a statement on strikers is obvious.



(New York World)

Soft music by the snake-charmer.



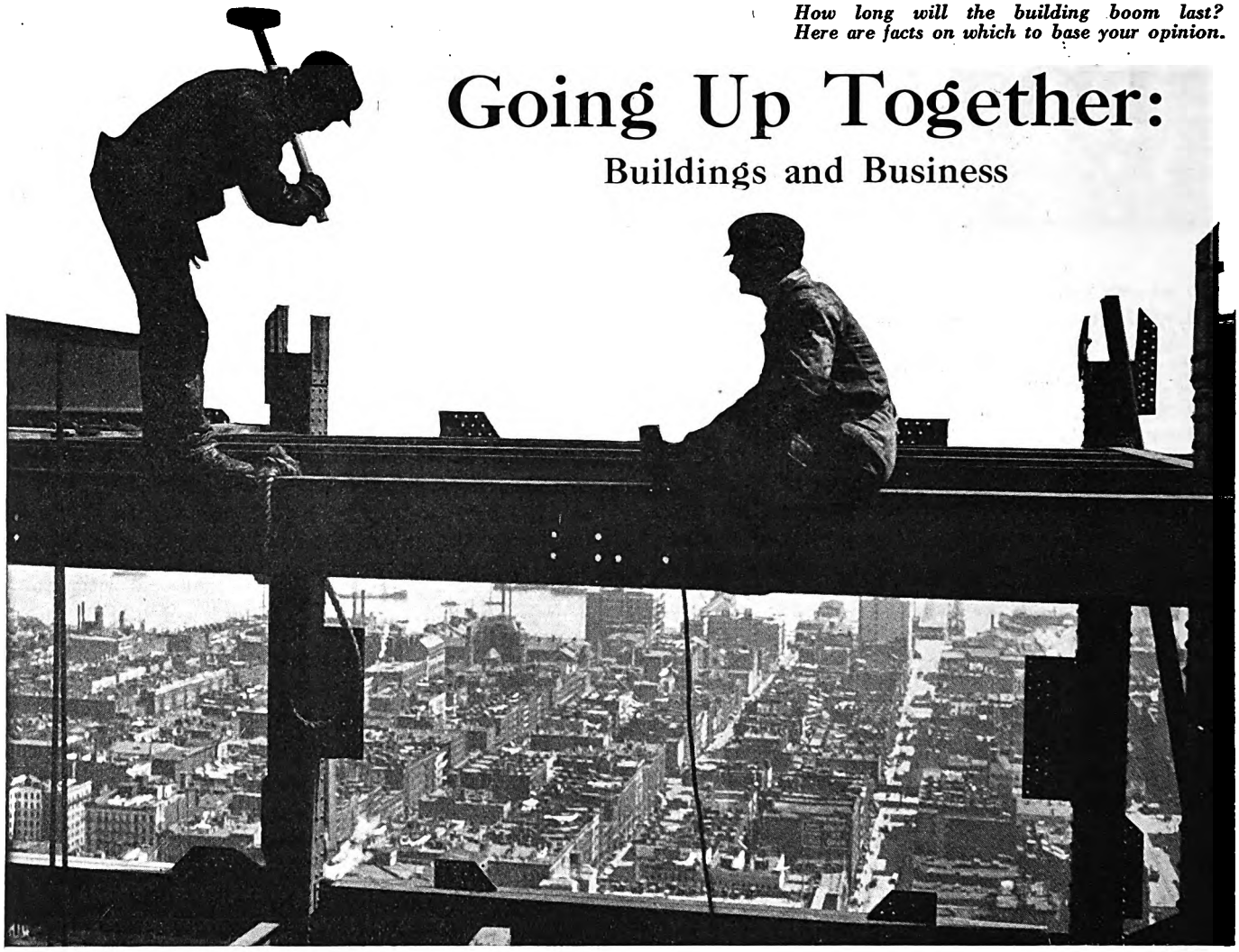
(Brooklyn Daily Eagle)

This threatens to become chronic.

How long will the building boom last? Here are facts on which to base your opinion.

Going Up Together:

Buildings and Business



Construction activity affects every line of business—it influences prices of commodities, is largely responsible for the employment situation and practically determines rents—business men should watch the building barometer closely.

WE are in the midst of the biggest building boom the United States has ever known. Throughout the country there is bustling in lumber yards and brickyards, chisels are clanking in quarries, steel mills are rolling out structural forms, carpenters are banging away with their hammers, masons are wielding their trowels and painters their brushes; and more structures are being erected than at any previous time in the history of the nation.

A boom—or a depression—in the construction industry affects all other lines. Construction is one of the key industries of the nation. It uses the products of about one-fourth of all the persons in the country who are engaged in manufacturing. It consumes about nine-tenths of all the iron, copper, zinc and lead produced. Normally, it is estimated, construction absorbs about half the new capital accumulated in the country every year. It affects all other industry through its influence on rents. The great number of persons who engage in it form an important part of the consuming public.

Construction has felt with unusually great weight the problems which afflict industry in general. It has experienced its full share of labor difficulties. It has been forced to deal with a scarcity of materials. It has been the subject of Government inquiries, and has suffered from much malpractice on the part of those who engage in it. Therefore its sensational recovery, at a time when most lines of business, though somewhat improved, are still languishing, is especially interesting.

The building industry was one of the first to feel the post-war depression. A chart prepared by the Associated General Contractors, comparing the fluctuation of pig iron production with the variation in the number of building permits issued throughout the nation, shows that activity in building started to decline in 1920, eight months before pig iron production began to sag. In fact, when the iron output started its downward movement the drop in construction was almost even. In November, 1920, the number of permits issued began to rise, and with occasional temporary relapses it has been on the upgrade ever since.

The increase in construction in 1921, however, could by no means be called a building boom. The total contracts reported in 1921 by the F. W. Dodge Co. for 27 Northeastern States was only $2,359,018,000, 8% less than the total for 1920. In other words, the 1921 record, while better than that of the latter part of 1920, was still so poor that the activity in the first part of 1920, before the depression, was sufficient to bring the entire 1920 record higher than that of 1921.

At the beginning of this year the real boom started. In January the Dodge company reported that contracts were 49% ahead of those for the same month last year, and the contemplated work bulked larger than at any time since the previous April. In February the contracts awarded were 7% ahead of January and 73% ahead of February, 1921. In March more contracts were awarded than in any other month except April, 1920, which was one of the big months before the depression. Spring was here, and outdoor work was going on in earnest.

In April, 1922, the contracts awarded in the 27 Northeastern States covered by the Dodge reports reached the unprecedented sum of $353,192,000, making April a record month for all time. The April record was 20% higher than that of the preceding month, and 60% ahead of April, 1921. The total contracts reported by Dodge for the first four months of the year amounted to slightly less than a billion dollars. This is about equal to the record of the first four months of 1920, before the depression.

This Year Will Break Records

MAY and June of this year carried the building boom even higher, and led to the expectation that the total for 1922, barring accidents, will be far greater than that of any other year. The May record of contracts awarded was 3% larger than that for April. Up to this time the record-breaking building had been confined almost entirely to the Eastern States. The West was coming merrily along, but it was lagging behind and not breaking all precedents. In May, however, all parts of the country broke records.

About 40% of all this building is for residential purposes. About 15% is for business, and about 8% for industrial purposes. The proportions remained approximately the same from month to month.

Behind the building revival is the tremendous demand for homes. If it were not for the housing shortage from which we suffered throughout the war, so remarkable a recovery in the face of adverse conditions would not have been possible to the construction industry. Thus even the housing cloud had a silver lining: the shortage of buildings made possible the construction boom, which in turn contributed largely toward the general industrial recovery (however slight) that has made itself felt this year.

The housing shortage, apparently, will furnish the stimulus for building for many years to come. Of 24,351,676 homes in the United States, 54.4% are rented, 28.2% are owned outright, and 17.5% are owned under mortgage by occupants. According to John Ihlder, manager of the Civic Development Department of the Chamber of Commerce of the United States, the shortage at the beginning of 1922 was equal to three years' pre-war normal production. "So great has this shortage become," he says, "that even if we begin on its reduction now, it will take us 12 years working at 25% above normal to provide as adequately for our population as we did before the war.

"Of course there will be a regular 25% above normal house production during either 12 years or a shorter period," he continues, "but such a statement enables us to visualize the situation more clearly, just as do the estimates which precede it, rough as these necessarily are because of our nationally characteristic lack of definite statistics.

"These conclusions are substantiated by the building permit figures, running back to 1914, from 24 cities of 100,000 population or more situated in every section of the country, and therefore taken as fairly typical. Of these cities 13 issued more building permits for dwellings in 1921 than in any one of the years 1914, 1915, or 1916. Yet the total number of permits for dwellings in all the 24 was less by 1642 than in 1914 and by 4982 than in 1916.

"From 18 of these 24 cities it has been possible to secure figures in greater detail, showing the type of dwelling constructed, whether one-family, two-family, or multi-family (apartment and tenement houses). Here the effect of the optimistic spurt in house construction early in 1919 becomes more evident. We had persuaded ourselves that when the war ended house building would begin. And so it did. But it slowed down again under the pressure of economic conditions until in 1920 it approximated the low level of 1918. During the optimistic era, however, these cities issued permits for nearly a normal number of houses, 22,877 in 1919 as compared with 23,133 in 1914, 25,309 in 1915 and 26,654 in 1916. The proportion of multi-family houses to one-family houses, however, was not the same as in pre-war years, though more like it than has been the case since."

In spite of the greatly increased building activity during the last six months, in this country, the housing shortage as a whole is still somewhat more than two and a half years' production, according to John Ihlder, the manager of the Civic Development Department of the Chamber of Commerce of the United States. In the opinion of Mr. Ihlder, the situation varies in different cities. In some cities the shortage is estimated as nearly four years, while in others it is approximately one and a half years, and in some cases even less.

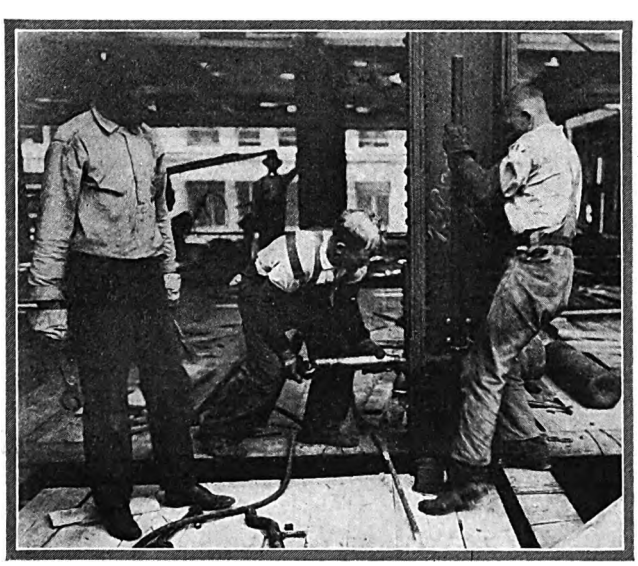
The labor situation in the construction industry is unlike that in any other. A great variety of highly skilled craftsmen are used in building. These trades were among the first to organize, and their unions are among the strongest in the country.

Corruption in the Building Trades

LEGISLATIVE inquiries in New York and Chicago the past few years have revealed a condition of corruption in the building trades unions that has astounded the entire country.

The two factors have been operating to slow up construction—weakening rent levels and increasing construction costs—continued to affect the general building situation adversely during May. In centers where residential construction has been heavy considerable recessions in the general level of rents continue to be reported. Although the rapid increase in the number of residential quarters will undoubtedly benefit the general public, it cannot fail to weaken the inducements to build at prevailing cost levels. Costs at present fail to show any decline in comparison with the decrease in rentals. Their general trend, on the contrary, appears to be upward. The two chief reasons for this are scarcity of materials in centers of the greatest building activity, and scarcity of skilled workers—which results in higher premiums being paid for these workers and resultant mounting building costs.

If the revival in the building industry continues smoothly, the housing situation will be alleviated, and business in general will be stimulated. But the path of the building boom is not



Good riveters are more to be heard than seen. A close-up of riveters snapped at work on the steel beams of a new skyscraper.

entirely smooth. It is threatened in particular by one outstanding danger: the danger that labor trouble in the industry may halt production and send building costs up to an absolutely unworkable level.

The entire construction industry was discredited by the revelations of the existence of grafting labor leaders, who combined with corrupt employers to keep building costs high and maintain monopoly conditions in the industry.

More Housecleaning Needed?

THE object of these investigations was to clean up the building industry. To some extent they succeeded. They resulted in the jailing of a few guilty persons, and—more important—they awakened the honest employers in the industry to a realization that they must stick together to maintain the reputation of their trade. But, according to W. A. Starrett, an eminent New York builder, the seeds of further trouble still lie in the unions.

"While many causes contributed, the system under which unions are conducted could hardly have led to any other result than the disclosures have revealed," says Mr. Starrett. "In fact, it may truly be said that the contributing causes merely accelerated an inevitable climax. Moreover, it is well known by those who have taken the trouble to inform themselves, that the culminations of the last year are only exaggeratcd repetitions of former building labor upheavals, which, while they occurred without the accompanying glamour of an economic crisis, were nevertheless the outcome of the same forces that so inevitably produced these latest scandals.

"The frequent recurrence of these upheavals, and the even more significant fact that the conditions revealed are on the increase, and that *no temporary* palliative, such as the conclusions of the Lockwood Committee promise to afford, *will have any lasting effect, leads to an inquiry into the underlying causes.*

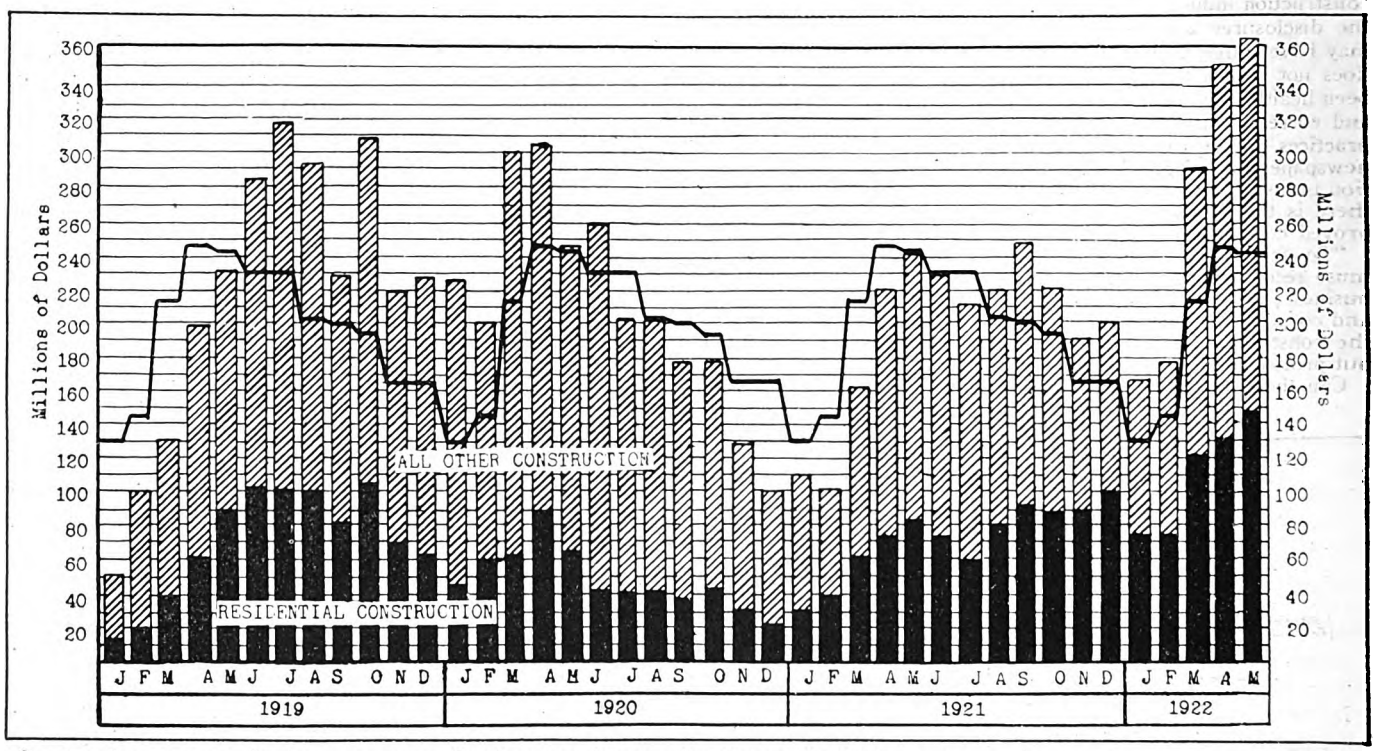
"We hear so much about vast funds belonging to this or that labor organization, and the election to office of this or that great labor leader, that we give little consideration to the details. Whence these vast sums? How are they administered, and what of the individuals who control them? What is their experience and fitness, and what accountability do they give? The facts seem to be that the questions of labor finances and labor leadership are all bound up in one, and both disappear into an appalling obscurity, judged by the standards that govern banking, corporation management, or, in fact, any known form of orderly business administration. As for the average union election, it is a crude and haphazard affair, if the standards of election as developed in free governments are any criterion.

"It is here that we commence to get at the root of the trouble, and here that we find the same human fallibility that governs in all other walks of life. The fruits of human greed, domination by the self-seeking, corruption and stealth, assert themselves and flourish in the rich soil of unaccountability which unionism has so fatuously pursued in the mistaken belief that by this means they were baffling their opponents.

"The condition in which labor finds itself today proves for the thousandth time that certain laxity of method produces about a certain result, and that all the sentimental appeal to public sympathy for the downtrodden, the sanctity of labor, and all other high-sounding phrases are merely illusive gestures in the face of the inexorable law to which they do such violence in their scheme of organization. A consequence of inside politics, the stultifying of free and uncoerced voting, and gang rule are inevitable concomitants of the policy that many labor unions in the past have allowed to flourish.

"In the revelations of its own shortcomings and the opportunities afforded for a clean, businesslike internal reconstruction, organized labor in the building industry today stands at the threshold of the greatest opportunity that has ever presented itself. Waning public sympathy could almost immediately be revived by labor unionism striking from its body the parasites of internal corruption and its twin, that spirit of law defiance which so menacingly resembles Bolshevism.

"Will the next cycle of building labor turn forward or backward? It seems trite to say that the unions hold their own destiny in the hollow of their hand, for even such a platitude needs further definition. Perhaps it would be more accurate to say that for the first time building trades labor, as now unionized and controlled, has been brought squarely before the bar of public opinion. The question is: Will it truly appraise the probation upon which its system is to be put by public opinion, or will it revert—shall we say—to type?"



Construction contracts let in twenty-seven Southeastern States. Continuous black line is ten-year average for each month.—*(Index*, organ of the Associated General Contractors.)

Public Co-operation Wanted

OTHER builders do not question the future so gravely as does Mr. Starrett. Noble Foster Hoggson, president of Hoggson Bros. and a director of the Associated General Con-

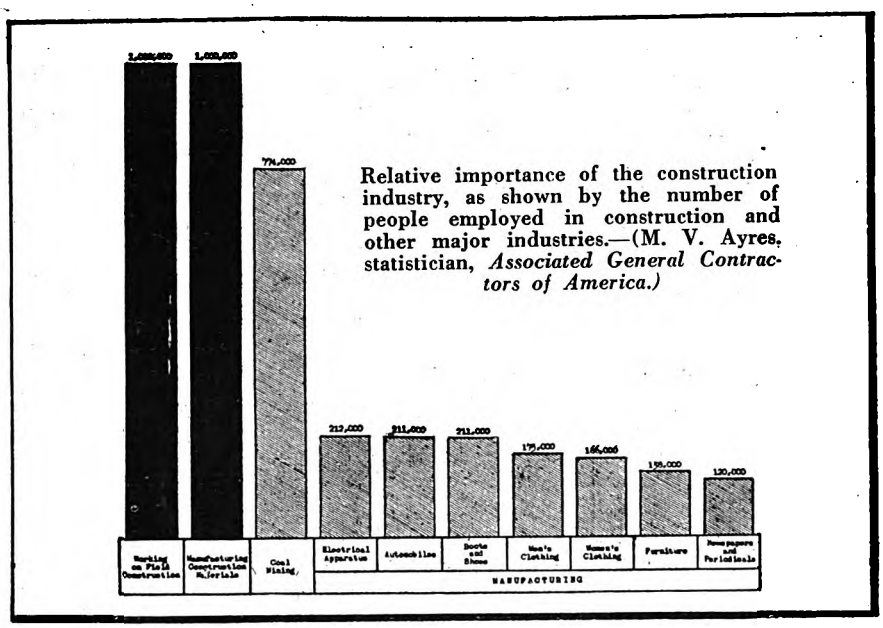
tractors, is more hopeful. Mr. Hoggson believes that the construction industry can keep itself clean, and asks that the general public cooperate ungrudgingly toward that end.

"Drastic steps are now being taken to cure for all time the evils which have been exposed by the Lockwood investigation in New York and the Federal Grand Jury inquiry in Chicago," writes Mr. Hoggson in *The Nation's Business*.

"It seemed to me necessary to face at the outset the fact of the public's state of mind toward the construction industry. No honest man in that industry regrets the disclosures which have been made, however unjustly he may have suffered from them; and probably there is none who does not realize that by this painful process the industry has been healthfully purged. So long as business proceeds smoothly and correctly, little notice is taken of its methods; when its practices are incorrect or dishonest they become a matter of newspaper publicity and public scandal. If all in the construction industry have suffered alike from these recent disclosures, there is the assurance that all will profit alike from the improved conditions which will follow them.

"To achieve this the general public must do its part. It must recognize, as it has not heretofore, its responsibility to business; and it should be willing to assist, by encouragement and cooperation, in building a spirit of justice and morality in the construction industry. Its indifference and inaction will but prolong the period of reformation."

Can the public be awakened in time?



Relative importance of the construction industry, as shown by the number of people employed in construction and other major industries.—(M. V. Ayres, statistician, *Associated General Contractors of America.*)

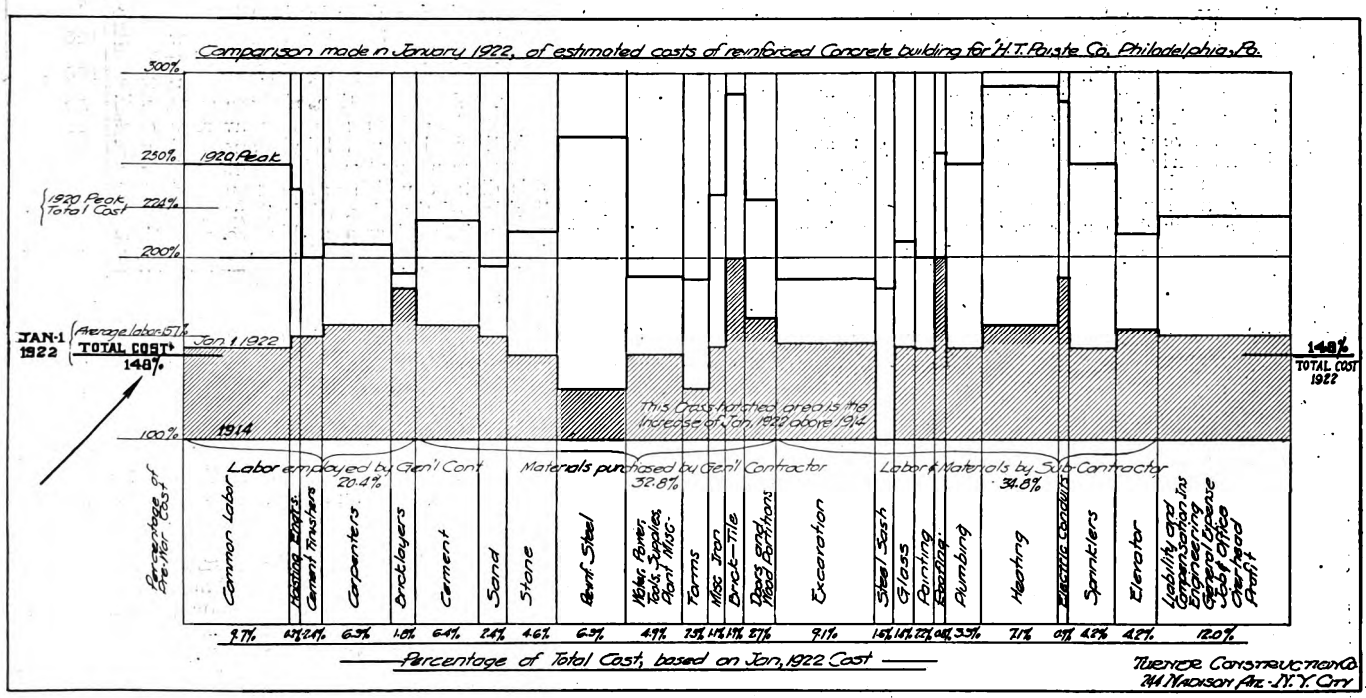
A Step Toward Stability

AN important step toward the reestablishment of the construction industry in the public confidence was taken in June, when the American Construction Council was formed in Washington. This organization is intended to bind together the entire industry, to defend it from attack within and without, and to deal cooperatively with its problems.

"Regarding the prime object of the council little needs be said. It is so important that its necessity is granted by all," says *The Engineering News-Record*. "The industry must establish itself in the confidence of the public. It may work for its own ends but those ends must never run counter to the public's interest. In other words, it must serve itself by constantly rendering better service to the people at large.

"There are other ends in view that are not so apparent. The new council should make the industry articulate. No one knows today what the construction industry really is. The statistics have never been gathered. All elements have not been sought out. These things the new council will do. Before the industry can properly interpret itself to the bankers, to the transportation interests, to other industries, to the public, it must interpret itself to itself. It must know its own magnitude and its own importance before it can have an adequate conception of its power, of its influence on the community, and of its responsibilities.

"One of the difficulties which will be met is that the council is confronted with a well matured industry. It must therefore



Before deciding whether or not to build now, study this chart, prepared by the Turner Construction Co., to show present costs in terms of 1914 costs, compared with peak prices in 1920. It is interesting to note that the general index of 148% places building costs below the general level of prices and that several items have receded to very low levels. While steel has risen in price, the advance has been offset by recessions in other items. The relative importance of the several items is indicated by the widths of the bars.

Materials the West Will Use

THE following is an estimate of the cost of the materials which will be used in buildings in the West during the next ten years:

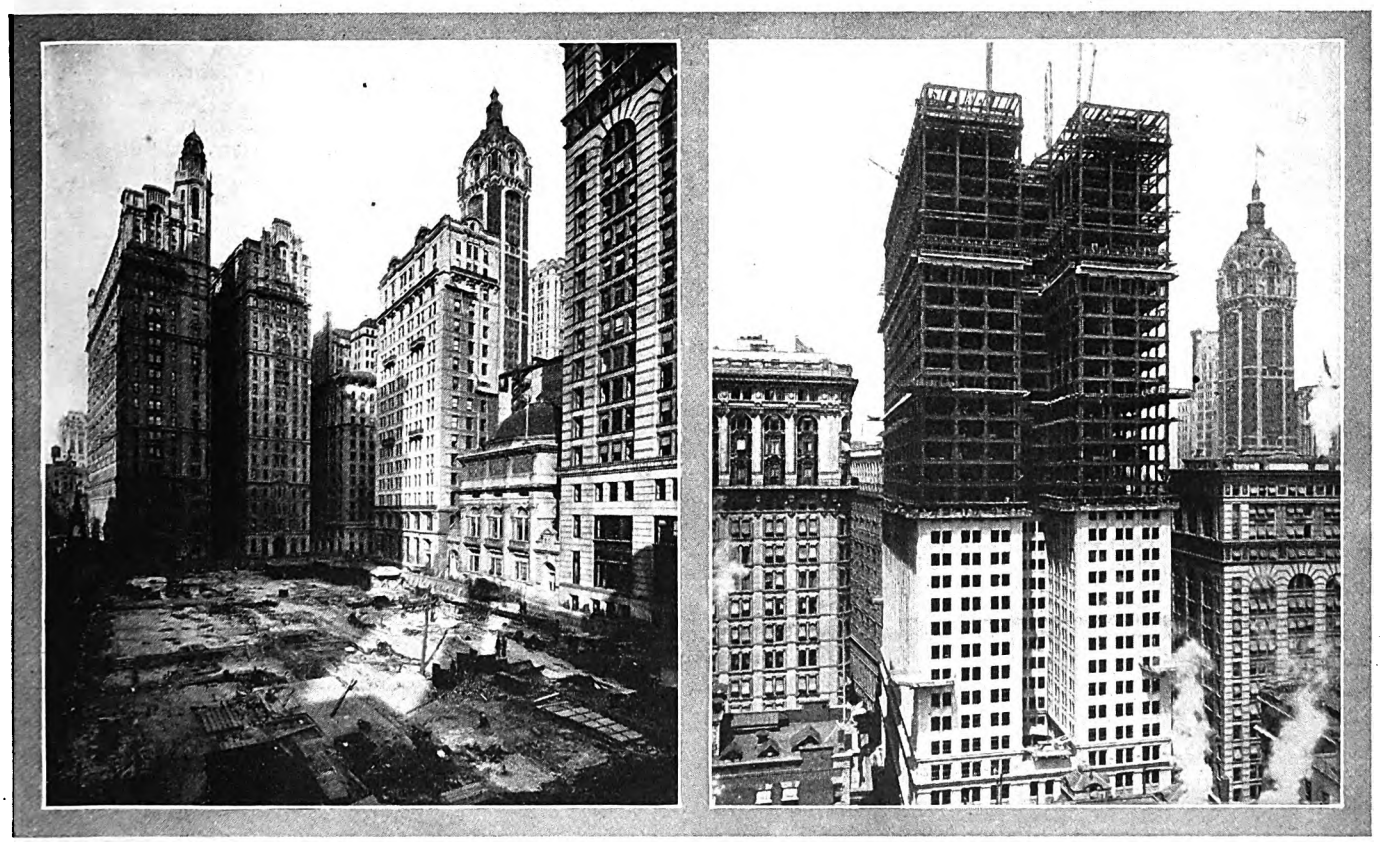
Foundation	$ 55,260,000
Structural frame	720,980,000
Lumber, millwork	624,464,000
Concrete walls, fireproofing	177,105,000
Roofing	42,914,000
Bricks, mortar	94,390,000
Plaster, laths	155,702,000
Plumbing	159,999,000
Paint	93,586,000
Glass	56,660,000
Marble	48,057,000
Hardware, nails	79,025,000
Electric materials	104,831,000
Flooring, tiles, etc	40,461,000
Ornamental iron	70,730,000
Sheet metal	14,800,000
Heating system	44,072,000
Elevators	100,780,000
Conveyors	5,000,000
Pneumatic tubes	13,000,000
Chutes	10,121,000
Vacuum cleaning system	1,600,000
Sprinkler	25,000,000
Sidewalk lights	2,526,000
Auxiliary power plants, etc	2,988,000

"An attempt was made to get a definite estimate of the equipment which will be required to outfit these buildings. No statement could be obtained from furnishing houses or others supplying office and home equipment, but a field survey of factories and business houses has offered the basis for what is believed to be a reasonable guess in the matter of future requirements. It is accepted as a general average that the costs of furnishing the average home are in the neighborhood of 15% of the cost of the building. From $150-$250 per room is a modest figure, which for an 8-room, $10,000 house means $1200-$2000. It has been pointed out that many of those moving into new houses bring their furniture with them and add only a few pieces. The house which they vacate must in that case be furnished by the new tenant—or, if the same process is repeated here, at least, with the increase of so much lodging space to that already existing in the community, an equivalent number of rooms must somewhere be furnished new. If it be considered that each new tenant down the line moves into larger quarters, so that the final newly furnished quarters prove to be a very modest workingman's home, it must nevertheless be considered that each tenant will have had to purchase some additional equipment, so that in the end, the amount will be roughly the same. An attempt was made to estimate how many families may bring their furniture with them from the East, but the number appeared to be so small that the deduction from this source need not be considered. So long as the family moves from one part of the West to another, the above analysis holds roughly true.

"In order to allow for all these factors, however, the figure of 10% of building costs was assumed as a furnishing expense. This gives $170,000,000 for home furnishings. In the case of commercial buildings there is still less chance of equipment being brought from a great distance and 10% flat has been allowed as a very modest estimate of furnishing costs in office buildings and mercantile establishments. This gives $166,000,000 for this field. An electrical wholesaler estimates that $30,000,000 will be spent in electrical equipment in the West every year, or $300,000,000 in ten years.

"The equipment needs of factories have been studied in considerable detail. Typical plants have been analyzed and their proportional figures applied to census returns in a typical field. The expenditure for machinery and factory equipment in the factories of the West in the next ten years will probably amount to some $2,222,450,000 for the industries analyzed. On the basis of capital invested in the industries investigated, which is approximately 50% of the total capital in all industries, this would mean roughly $4,400,000,000 in equipment for all industrial plants in the West."

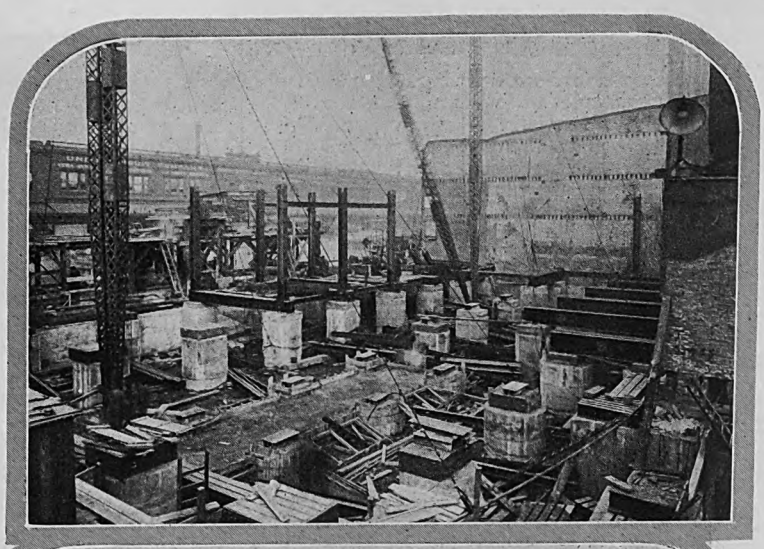
This prediction may or may not come true. In any event, it shows how broad are the effects of a building boom upon business in general, and how extensive and continuous the boom is expected by some authorities to be.



(Photos courtesy Thompson, Starrett Co.)

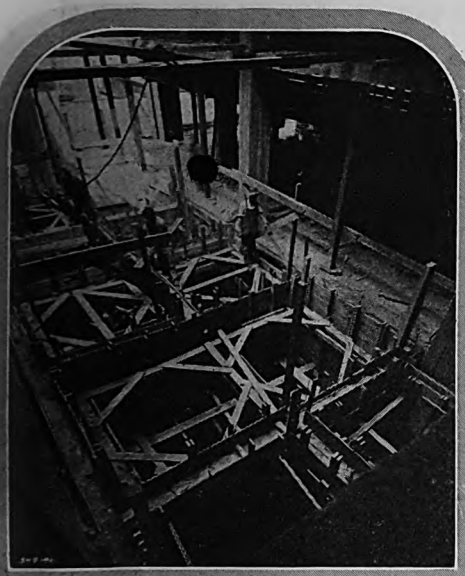
Before and after pictures of the world's largest office building. The "decks" are cleared for action at the left. The Equitable Building now houses the offices of many of the world's most famous industrial organizations.

Flesh, Steel Bones and Industrial Giants



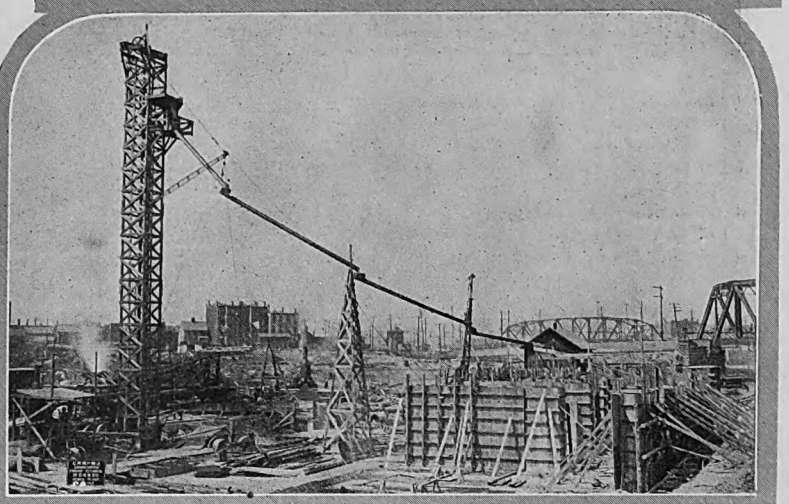
(Right) Caissons are the answer to the admonition: First build your foundation right. The strongest structures of steel would remain literally "houses built on sand" but for the sturdy pieces of engineering skill which, forever hidden underground, shoulder the responsibility for the thousands of tons above. The first steel frame-work just placed on the caissons gives little indication of the size and strength of the large warehouse to be reared above it.

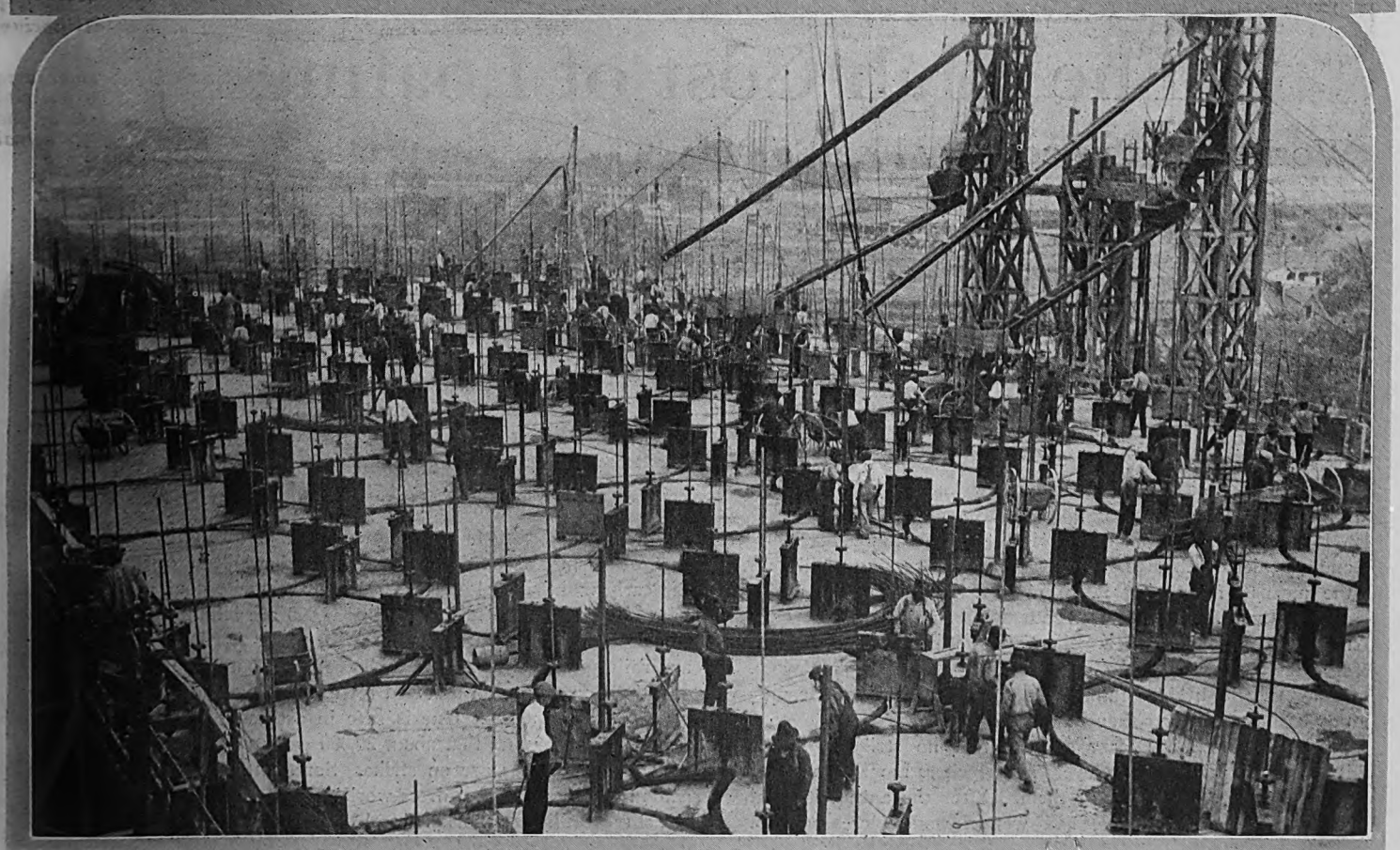
(Building photographs by courtesy of Turner Construction Co., Thompson-Starrett Construction Co., George A. Fuller Construction Co., and Engineering News-Record)



New concrete towers need not be erected when use can be made of a concrete conveyor system as seen at the right. (Below) Erecting huge grain bins. As the work progresses the concrete molds are moved upward.

(© Galloway)







The High Cost of Loafing

Workers in this country lose $5,000,000 a day in wages on account of labor troubles—who pays this enormous strike bill?

OVER all industry—and especially over the building trades—hangs the spectre of labor trouble. Building contractors, in making estimates for a structure, always add a percentage, sometimes as high as 50%, for contingencies; and nine times out of ten the main contingency is a strike, or the threat of a strike.

Other industries also suffer from the same disease—perhaps in a lesser degree, but still they suffer. Strikes are the greatest bogies of modern industry.

Business men know this. Workers know it. The public knows it. Yet strikes multiply.

If the American people—workers, business men, farmers, and all—decide that this condition must stop, they will find the means of stopping it. Evidently they have not so decided. Instead of concerted attempts to end strikes, each month brings forth a new collection of threats. The employers defy the workers. The workers defy the employers. Apparently both sides think they can gain more by a condition of industrial war than industrial peace.

THE INDUSTRIAL DIGEST submits that no strike is worth its cost. Strikes cost employers and workers more than either side can hope to get out of them. After the anthracite coal workers, some years ago, had won a wage increase by a strike, it was computed that it would take them 15 years, if they continuously saved every bit of the increase they had won, to get back the wages they lost while the strike continued.

A statistician of the National Industrial Conference Board has computed that American workingmen now on strike are losing something like $5,000,000 a day in wages. The loss to non-striking workmen who have been thrown out of their jobs because of the strike is probably just as large, but no data are at hand from which to compute it.

An Industrial Army A. W. O. L.

ABOUT 1,250,000 men are now on strike. Roughly 80,000 of them are textile workers, who have been out since the early months of 1922; 155,000 are anthracite coal miners, who have been out since April 1; 573,000 are bituminous coal miners, who have also been on strike since April 1; 400,000 are railway shop workers, who have been out since July 1; and the balance are an assorted lot of building-trade workers, clothing workers, etc. One is safe in assuming at any time, year in and year out, that about 20,000 workers in the clothing and garment trades are on strike. Sometimes they are boys' pants makers, sometimes dress workers, sometimes cap makers, sometimes millinery workers, and sometimes another kind of

needleworker; but some of them are always out because of a quarrel with employers.

Lost: Ten Million Hours

ASSUMING an eight-hour day, these 1,250,000 strikers represent a loss amounting to 10,000,000 man-hours every day. It would take 100 men, working continuously for 300 days a year, five years to offset a single day's loss at this rate.

This is only one side of the picture. The other is the loss in production to industry, and the loss in profits to employers. These cannot be computed. Figures on the loss of production due to the coal and textile strikes, for instance, cannot be found, for there is no way of telling how much would have been lost in these industries regardless of the strike, because of seasonal shutdowns and lack of business. In the absence of reliable figures all we can say is that the losses are tremendous.

Marshall Olds, in his book *The High Cost of Strikes,* has attempted to compute the price which industry and the public pay for industrial warfare. He believes that strikes were the basic cause for the tremendous post-war increase in the cost of living.

Mr. Olds points out how a strike of dock workers in New York was expensive to a far greater number of persons than were involved in the controversy. The strikers tied up the docks of the Clyde, Mallory and Old Dominion steamship lines. An important part of the freight of these lines consists of fresh vegetables raised in the South for consumption in the North. The strikers walked out just when the biggest run of this class of freight had started.

The effects of this strike are worth tracing, because the process is clearly illustrative of the manner in which transportation strikes exact their toll of the community. A short while after the strike was declared New York was sorely in need of potatoes. A special attempt was made to get a cargo through. The vegetables were brought safely to the dock, within 300 yards of the warehouses—but these last 300 yards were blocked by the strikers. Finally a lighter was secured and the potatoes were secretly moved aboard it. The lighter was towed down the Hudson River and up Newark Bay to Harrison, N. J. Then trucks were employed to carry the potatoes from the lighter to the Erie Railroad, which carried them to New York. The cost of this roundabout transportation was $4 a barrel. New Yorkers paid the price. They were glad, at that time, to get the potatoes at any cost.

There was no real gain from the additional $4 which were added to the cost of those potatoes. It was purely economic waste. Items such as these must be added to the schedules of wages and production lost, when we calculate the cost of strikes.

A strike need not be in a fundamental industry in order to be costly. Railroad, coal, steel and building strikes naturally spread their disastrous effect more widely than disturbances in trade which are less important to industry in general; but even a walkout of a few thousand printers can cut deeply into the economic life of the nation.

It is estimated that more than 1,500,000 workers suffered serious losses of wages for three months in the winter of 1919-20, because 2000 New York printers all went on a vacation at the same time. The strike came in the fall, when the print shops of the city were preparing great quantities of mail-order catalogues and other sales literature. The great New York mail-order houses sell to about 10,000,000 customers, scattered throughout the country, and their sales depend almost entirely upon their catalogues. In addition to the regular mail-order concerns, great numbers of jobbers and manufacturers in the metropolis, especially those handling dry-goods lines, depend on printed matter for their sales.

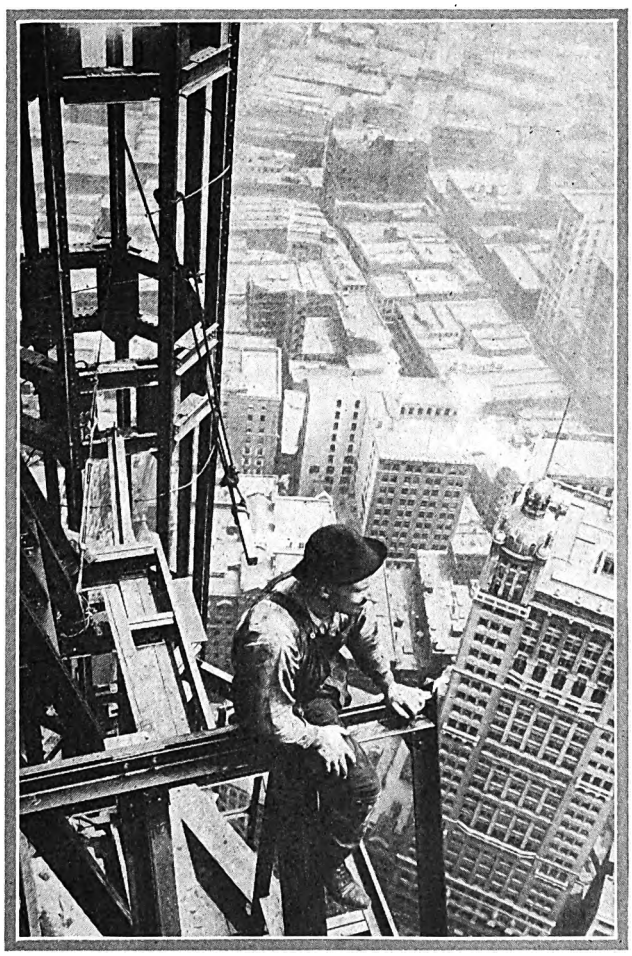
The Innocent Bystander

AS a result of the walkout of printers, millions of copies of these catalogues were not printed, or were printed several months late. According to Roger Babson, who is quoted in Mr. Olds' book, "The whole manufacturing programs of hundreds of these firms were held up because they could not get out their catalogues. It is estimated that these firms employ more than 500,000 persons, and indirectly give work to 1,000,000 others. Thus the strike of only a few thousand men in one industry affected 1,500,000 in another line of production. And back of these 1,500,000 are still more men and women whose work and earnings suffered."

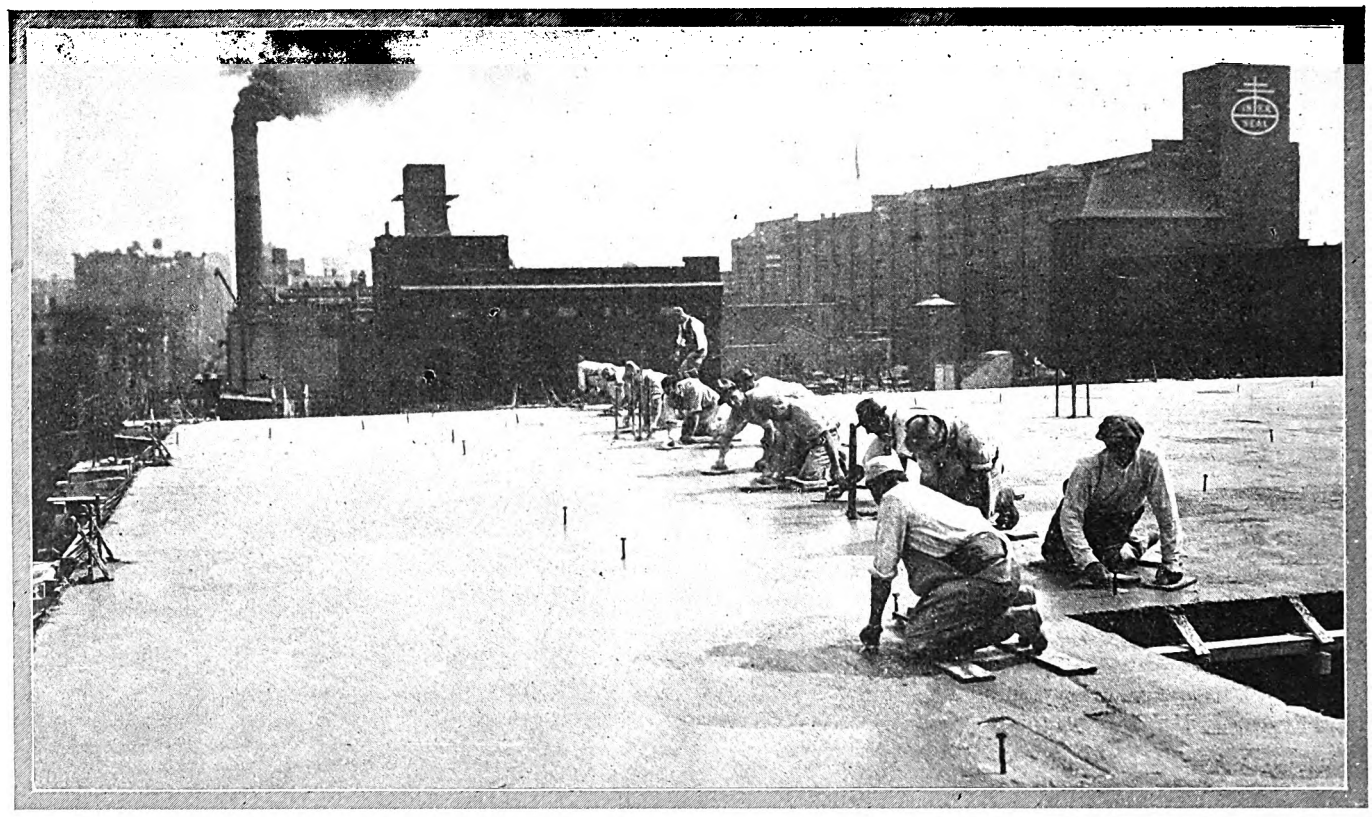
Some idea of the economic effect of the present textile strike may be gathered from the story of a smaller textile strike in the spring of 1920. A certain group of cotton mills in the Fall River district were closed for 18 weeks by a strike. In addition to the loss of production and wages, the manufacturers lost a body of skilled workmen they had been building up for years. But the greatest loss was further removed from the mills. Here is how:

The commission house in New York that handles the production of this group of cotton mills employs a large group of salesmen. Each of these salesmen has a string of customers who regularly depend upon the company to supply them with certain classes of material. To keep the sales organization together and the customers contented, the company had to go into the open market to buy the goods that their own mills usually produce. Because of the shortage, which was due largely to this very strike, they had to pay just $2,000,000 more for the goods than it would have cost them to produce the same material. Another $2,000,000 wasted needlessly!

Union labor's reply to statements pointing out the excessive



One of the futuristic views of New York that provide an aspect unique among the cities of the world.



(Photo courtesy Turner Construction Co.)

The finishing touches to the modern factory—the careful, "hand-made" concrete roof.

cost of strikes is this: "Regardless of the cost, we must strike to protect ourselves. The strike is the only weapon by which the American worker can win increases in wages and maintain his standard of living."

To this Mr. Olds replies that strikes cost the workers more in wages lost than they gain in increases. The net result is a loss. He specifies:

"Carpenters, through various strike 'victories,' got a 65% increase in their rate of wages in 1919, but their actual earnings decreased 3%.

"The coal miners, as a result of the great coal strike and all the maneuverings and politics and negotiations that followed got an increase of 14% in wages. But because of the system that the strike 'victory' helped to perpetuate the average skilled miner is getting 50% to 60% less wages than he otherwise would be earning.

"As a result of the clothing strike 'victories,' wages were increased from about $35 a week to $65, and often more, for 35% less work. But a year later, during what is normally the busiest season of the year, half of all the clothing workers were walking the streets.

"As a result of various strike 'victories' in 1919, many classes of textile workers got an aggregate of 22% more wages for a considerably lessened production. But after months of idleness during the latter part of 1920 the same workers were glad to take as much as a 30% reduction of wages to get back to work for even part time.

"In the steel industry, on the other hand, where the strike failed, while wages were voluntarily raised from 114% to 150%—but on the basis of full maintenance of production—during 1920 there was practically no unemployment; the reduction of wages which some of the smaller companies made, due to the demand for reduced prices, were trivial in comparison, and the largest steel companies, up to March, 1921, had not been forced to reduce wages at all."

It is not necessary to accept all of Mr. Olds' statements in order to agree with his general argument.

The less tangible evil effects of strikes are no less extensive than the money losses. Strikes, and the spirit that leads to them, produce bitterness between employer and worker, cause labor to be inefficient, and create worry and mental wear and tear throughout industry.

The worry incident to strikes affects great numbers of persons. A man whose business is to supply live chickens to the Kosher butcher shops of New York's East Side said the other day that the railway strike was ruining his nerves.

"Some of the railroads in the West have declared partial embargoes," he said. "When I get down to the market in the morning I'll probably find that the price has gone up five cents a pound because the dealers think the shipper won't be able to send them the chickens they expect. It will be hard to sell chickens at the higher rate, and the market will come down. Then there will be another strike rumor, and she'll shoot up again. Trying to follow it and do business is driving me half crazy."

The inefficiency due to the strike spirit is most flagrant in the building trades. A grand jury which conducted an investigation into the construction industry in Cleveland not long ago reported:

"We should be remiss in our duty did not we point to a lamentable condition which no doubt has injured the very group (labor) which created it as much, if not more so, than the public generally.

"We refer to the present tendency upon the part of mechanics, artisans and laborers of all trades to do less than a full day's work.

"The testimony adduced before us indicates conclusively that it requires approximately twice as long, with the same number of men, to erect a house today as it did in pre-war times.

"Impartial tests show that it takes twice as many carpenter hours to do carpenter's work on a building as it did five years ago.

"Bricklayers lay less than half the number of bricks; paperhangers, painters and plasterers all do less than half the work in the same time that they did five years ago.

"Manufacturing firms which make and sell building materials prove by their records that while wages have gone up 200% in some instances, labor cost has gone up 400%, indicating that their employees are getting double pay for one-half the work, as compared with the period before the war."

So costs go up, and industry suffers. All this is due to strikes and the spirit of strikes. If we all realized how expensive it is to carry on industrial warfare, would we not devote our energy to stopping it?

A Good Time to Start a Business?

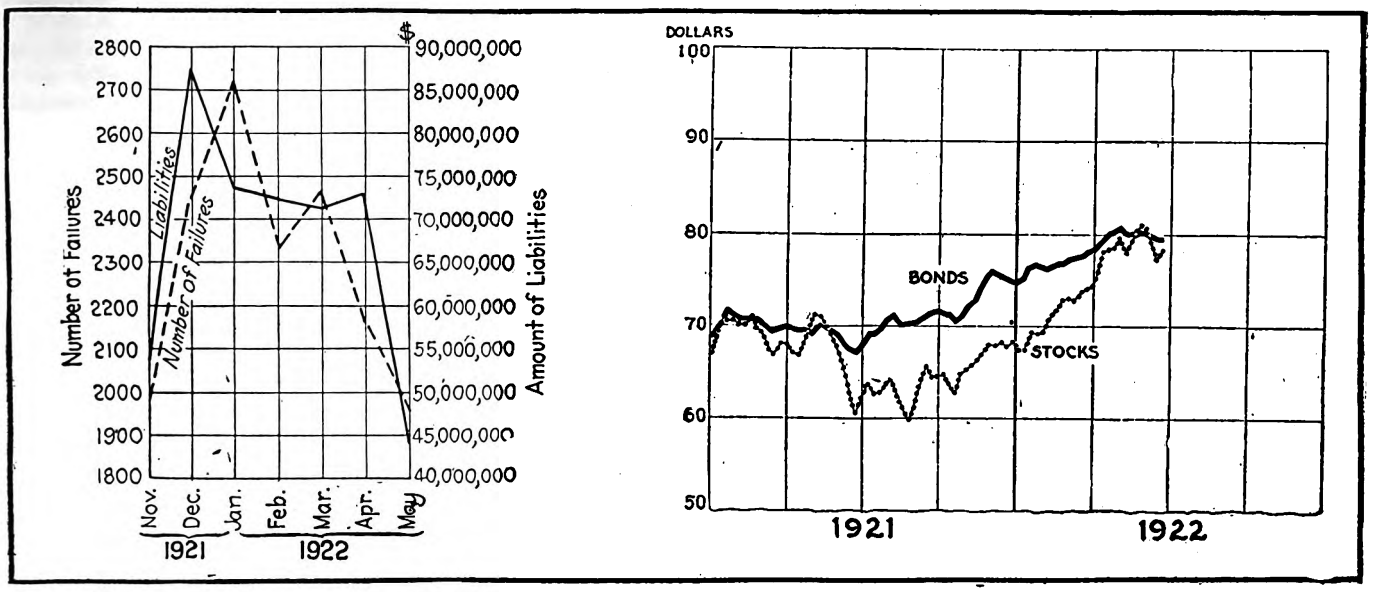
IT is easy to be sagacious in boom times. A large part of American business psychology consists in being anxious to invest when securities are high and to get panicky and wish to sell when values are low. The American is a poor gambler on his country's future—he is apparently disinclined to play long on America during and immediately following depression.

A casual study of the much-discussed business cycles reveals the basic similarity of all economic movements through boom times with high prices, low interest rates and inflation, through deflation with falling prices and heavy capital charges, to the readjustment period with low production costs and low money rates.

Obviously the best time to begin a new enterprise is at that stage of the cycle immediately following the depression—that stage, in other words, which witnesses the first signs of returning health, such as steadying prices, higher bond values and increasing production. The casual study of cycles referred to makes it possible to carry out the maxim: Buy low and sell high. There is neither magic, luck nor a sixth sense in being able to play with the cycles.

The charts on this page reveal the present trend of the cycle as being definitely on the upward path to prosperity. Continued higher security values and continued decrease in the number and liabilities of failures are not unrelated accidents. Making full allowance for the "prosperity talk," and fully discounting future hopes, the fact remains that investments are surer of increasing yields and that the chances of business fatality have been considerably lessened.

The answer to the question, is this a good time to start a business?, becomes almost self-evident. A moment's reflection brings the fact to mind that in spite of the rosy prospects in boom times prices must come down and large profits yield to stringency. The enterprise begun in boom times is soon likely to find itself saddled with inventories, stocks bought at high prices, markdowns and heavy capital charges—a combination of bogies that is liable to spell ruin. Unless all past economic signs fail this is an opportune time to launch an enterprise, always assuming, of course, a sound understanding of one's business and a freedom from "get rich quick" psychology.



Number of commercial failures and amount of liabilities, by months.—*(Iron Age)*

Average weekly prices of 40 bonds and 50 stocks on the New York Stock Exchange.—*(Federal Reserve Bank, New York)*

The trend as shown by falling lines of failures and liabilities and rising curves of stocks and bonds.

What Constitutes the "Spread"?

IN an open letter to Senator Porter J. McCumber, chairman of the Senate Finance Committee, the executive committee of the National Retail Dry Goods Association refutes the sweeping charges that American newspapers were subservient to advertisers and that American merchants were profiteering tremendously at the expense of the people. In making this charge the Senator designated the "spread" between the foreign cost and the retail price of each of the articles of the exhibit as the profit. For example one of the Senator's statements was as follows: "Here is a little watch, silver-backed, I think. I do not know whether it is bought by the gross or by the piece. The foreign cost is $1.00, and it is retailed in this country for $9.45. The spread therefore is $8.45 and the profit of course would be 845%."

But the Dry Goods Association letter points out that to the foreign cost of any article must be added the cost of foreign buying, inland freight abroad, consular fees, freight and insurance, duty to the United States Government, custom house charges, general overhead, the cost of doing business in this country and Federal and other taxes. The spread between the cost so determined and the price at which the goods are sold represents the true profit.

That the importance of imported merchandise to retail stores lies in quite another direction than "profits" was shown in the brief which the Association submitted to the Senate Finance Committee on January 17, 1922. In that brief it was stated "of the entire membership of the Association a very small proportion only do any direct importing and the total amount of imported commodities, whether directly imported

(Turn to page 1320)

Walkout or Holdup?

Is the rail shopmen's position tenable—or will they put business in the position of saying to the shopmen, the coal miners and the textile workers—"Three strikes—and out!"

THE railway strike presents an interesting opportunity for the study of the use of diplomacy in industrial warfare. All three parties to the strike—railways, unions and Government—devoted their chief attention during the first two weeks of hostilities to jockeying for the diplomatic advantage. They all issued statements, demands, denials, counter-claims, threats



(Washington Evening Star)

Along with other reductions.

and appeals to the public. The relative positions of all three parties changed from day to day, creating an effect upon the public of considerable uncertainty and confusion.

The strike opened quietly, giving alarm to only a few. Shortly after the shop crafts walked out the maintenance-of-way unions announced that they would not strike, and it seemed that Mr. Jewell's men were isolated. Predictions were heard on all sides that peace would come soon. Everyone pitied the poor strikers, and predicted that they would capitulate in a few days. Mr. Jewell apparently felt the uncertainty of his position, and hastened to make it clear that he was ready to discuss peace. The Railway Labor Board, not to be left in the background, also sent out diplomatic feelers intended to lead to an armistice. Only the executives, who felt strong, said little.

This situation lasted only a few days. Reports soon began to come in that trains were late because of the strike. Some of the roads announced the cancellation of trains, and proclaimed freight embargoes. This lent strength to the diplomatic position of the unions, which gave statements to the newspapers showing that the walkout was complete, and attributing the embarrassment of the railroads directly to the strike. Many of the roads attempted to counteract these statements by declaring that the delays were not due to the strike, but would have occurred in any case.

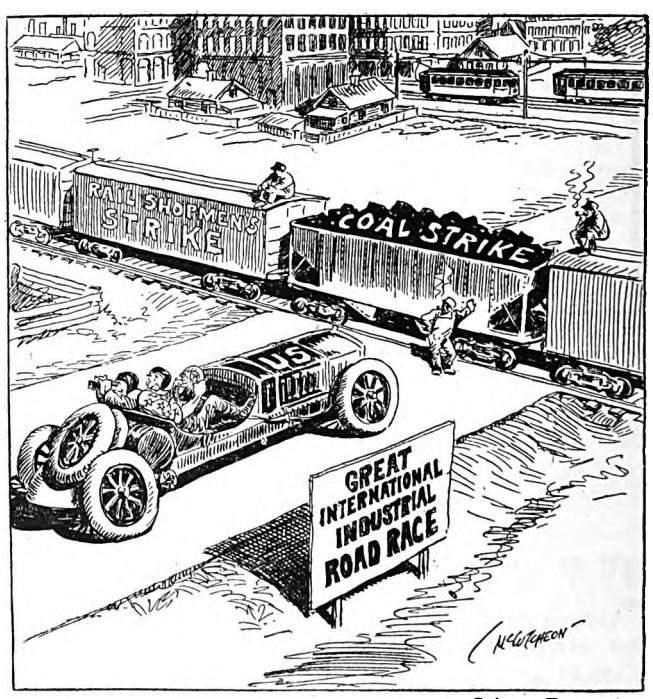
At this point violence began to appear, and the strike seemed less harmless than it had looked at first. Mr. Jewell denied responsibility for violence and warned his men to be careful. The American Federation of Labor began to permit the public to know that it was supporting the strikers. The maintenence men, the clerks and other unions talked strike again. Eight thousand stationary firemen, engineers and oilers announced a walkout. Things began to take on a serious tinge.

This was the signal for the Administration to make itself felt. It would not do for the Government to let it appear that it was not protecting the people. Accordingly President Harding proclaimed officially that the trains would run or Uncle Sam would know the reason why. The Post Office and War departments let it be known that they were ready for all contingencies.

Yet unions, roads nor Government were willing to appear too belligerent. All three wanted to be in the best possible position when the time for a settlement really came. Therefore calls for conferences were issued, private conversations were held and vague hints at terms were passed from one hand to another. One moment things looked hopeful and the next moment things looked black again—all because of the diplomatic jockeying for position.

The confusion of this situation was reflected in the editorial comments of the newspapers. Most editors seemed unable to determine just what the situation was at any particular time, and how seriously the strike should be taken, and accordingly contented themselves with condemning the unions and urging a prompt settlement.

Among the few newspapers that saw a little beneath the surface was the *New York Evening Post,* which pointed out



(Chicago Tribune)

Jeopardizing his lead.

as follows the difference between the situations of the railway shopmen and the maintenance men:

"When railway shop workers and maintenance-of-way men talked strike in the last days of June it was assumed that both classes of employees had a common ground for action. The recent wage cuts were the *casus belli.* Actually the two organizations have separate grievances. For the maintenance men, as the lowest-paid class of railway labor, the wage reductions are a real issue. Measured absolutely, a maximum

weekly wage of $16 is hardly a living wage. Measured relatively, the reduction in pay for the maintenance men was heavier than for the shop workers with nearly three times as large a wage.

"To the shopmen the real issue is not wage reduction but the defense of their organization against the practice of out-contracting by the railroads, a practice which removed a large number of men out of the protection of the transportation act, both as regards working conditions and pay. It was a real grievance, but not a justification for striking, inasmuch as the Labor Board had declared against the out-contracting practice and had already brought pressure to bear on the railroads, with results which promised an adjustment of the problem in the near future. The shopmen struck against a Labor Board that sided with them on their principal demand. Before the strike broke it was intimated from labor sources that if the out-contracting issue was settled a strike could be averted. Yet today we have the strike of shopmen and as the first result a declaration by the board that the strikers are no longer under the protection of the board. The strike has intensified the menace against the union which it was intended to avert.

"The maintenance men have been fortunate in the possession of better leadership and greater common sense. Instead of flouting the promise of relief held out by the Labor Board in the form of a possible upward revision of wages, they have accepted that promise as sufficient reason for holding off the strike. That is excellent tactics. Their case for a reconsideration of wage cuts, originally a good case, is now strengthened in the public mind by their refusal to run amuck at the public expense.

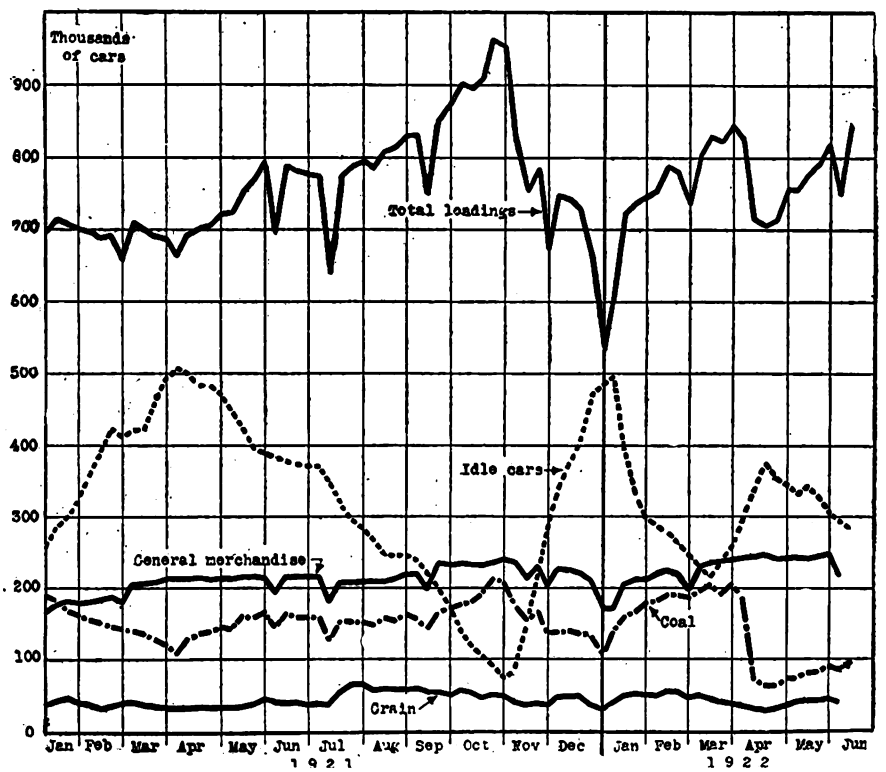
"It is not too late for the shop workers to get back to a policy of common sense. If they announce their intention to return to work in the expectation that the Labor Board will do them justice by abrogating the out-contracting evil, the public will overlook the exuberance of a 'runaway' strike. That same announcement a week later will be regarded only as a confession of defeat."

Car Loadings Rise Despite Strike

THE drop in loadings in November and December is a normal phenomenon and is chiefly accounted for by the seasonal let-up in the coal and grain movement. As loadings drop idle cars naturally increase. The accompanying chart shows the idle cars in good order only.

Normally the early months of each year witness a decline in car loadings. The opposite trend in the current year was believed by some to indicate a marked trade revival, but a considerable part of it was due to the stimulated movement of coal in anticipation of the strike. Cars were not only used to move coal, but were also employed in considerable numbers to store it.

With the beginning of the strike on April 1 coal loading dropped sharply and this brought down total loadings. Beginning with the middle of that month, however, total loadings again started upwards, and they have now reached the high point of the year in spite of the loss of coal traffic, indicating that general business has actually improved considerably. The latest report on car loadings did not give separate figures for grain and general merchandise loadings for week ending June 10 and these are not shown.—(*N. Y. Evening Post.*)



New Air Brake Insures Effective Control

EDGAR E. CLARK, former chairman of the Interstate Commerce Commission, appearing before Examiner Mullin, urged the adoption of the automatic straight air brake, which, he said, has been found safe and effective.

In urging this new brake, Mr. Clark enumerated these defects in the type now used, as evidenced in the records of the commission:

(a) The inability to control heavy trains down heavy grades, without the use of hand brakes.

(b) The inability to obtain emergency pressure during or immediately following a service application. This defect has resulted in accidents due to emergency arising after the service application had been made, and to the fact that the emergency pressure was not for use.

(c) The undesired emergency application of brakes, due to faulty construction and operation of triple valves, again causing many accidents, breaking in two of trains, derailments, injuries to employees and others because of the unexpected shock, pulling out of drawbars, and even the ends of cars, damage to the lading of cars, including inflammable and explosive articles.

(d) The difficulties encountered in attempting to release the brakes on the rear end of long trains, resulting in the pulling out of drawbars and other damage to cars and lading, and in injuries to employees.

(e) Uneven braking, due to varying piston travel, causing flat and broken wheels, which, in turn, cause derailments and heavy loss.

Mr. Clark showed that the cost of the wheels so destroyed is a very important item in the operating expense of the railroads, but that with the adoption of the automatic straight air brake all of these troubles would be eliminated. With it, any train could be controlled safely and securely on any grade and under any conditions. With it emergency pressure would be available at all times. It would also equalize the braking power throughout the train regardless of uneven piston travel.

"There's Business in Brazil"

Of all our South American neighbors the United States of Brazil offers perhaps the best opportunity for manufacturers desiring export outlets.

BRAZIL, according to a report of the United States Department of Commerce, is "a field of great potential wealth, the exploration of which has scarcely more than begun, and which offers in the future unmeasured opportunities for trade in both directions. . . . A number of elements have combined to create a favorable market in Brazil for goods from the United States and the country offers a more promising immediate opportunity for various lines of our export trade than any other in South America."

Surely American industry, which needs to cultivate its export markets assiduously if it is to reach the high prosperity of which it is capable, will find it worth while to pay attention to such an opportunity.

Brazil as a commercial nation will be brought to the attention of the world by an international exposition, commemorative of the one hundredth year of Brazilian independence, to be opened in Rio de Janeiro on September 7. The products of many nations will be exhibited, and the Congress of the United States has appropriated $1,000,000 to pay the expenses of American participation. Therefore a review of the trade possibilities of Brazil is timely now.

In spite of the fact that the exploration of Brazil's wealth has hardly begun, that country has been for some time one of the leading nations with which the United States has traded. In 1921 we shipped goods valued at $128,746,345 to Brazil. Our imports during the same year amounted to a slightly larger sum: $147,520,940.

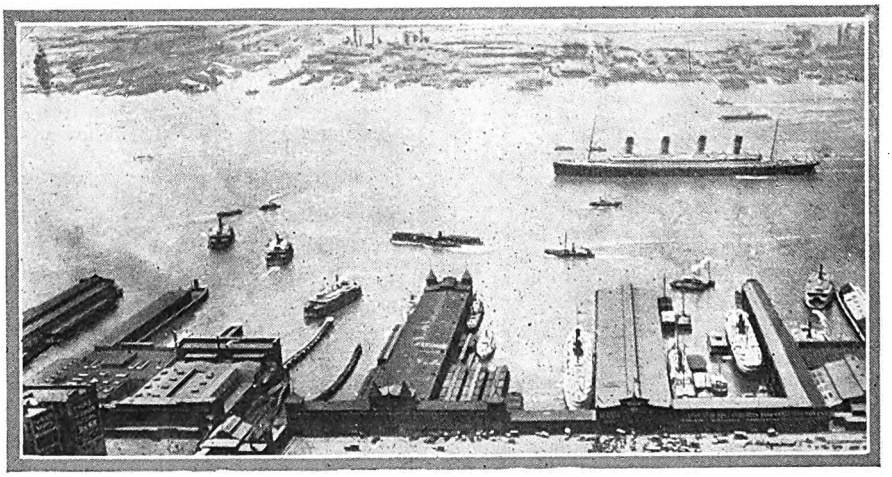
Between 40% and 50% of Brazil's total imports come from the United States. In 1919 we sent her 48% of her imports, and in 1920 the figure was 42.1%.

Brazil's Chief Products

THE chief wealth of Brazil lies at present in two products—coffee and rubber, shipments of which make the larger part of her exports to us and to the rest of the world. Besides these, Brazilian products of greater or less importance are cotton, cacao, sugar, yerba maté (Paraguayan tea), tobacco, nuts, hides and skins, gold, manganese ore, precious stones and carnauba wax. Mahogany, ebony and a variety of other hardwoods are scattered through the forests and might be profitably exported, but at present labor is lacking, and the cost of getting out these products is prohibitive. Fiber plants, fruits and grain are other products which might be developed if the energies of the people of Brazil were not otherwise directed.

The nation also possesses deposits of iron and coal which some day may be of importance.

The State of Sao Paulo produces a large part of the world's supply of coffee. Two million of the 4,500,000 acres under coffee in the whole country, and 685,000,000 of the 1,320,000,000 trees, are in this State.



The rubber forests of Brazil, according to a Brazilian authority, cover an area of 500,000 square miles. This is half of the entire rubber regions of South America. Until the development of cultivated rubber fields in the Far East, especially in Ceylon, Brazil was the foremost rubber-producing nation of the world. The Ceylon rubber, although not equal in quality to the *Para Fina* of Brazil, serves most purposes, and is seriously damaging the Brazilian trade. The price of the wild Brazilian rubber has been kept up by the heavy import duties on supplies going to the rubber district, the difficulty of transportation, trouble with the rubber laborers and similar difficulties. The Brazilian government is endeavoring to improve the situation.

The United States is Brazil's best customer for her coffee and rubber. In acknowledgement of this fact, Brazil allows preferential tariff treatment to many American commodities which she imports.

Brazil's Principal Imports

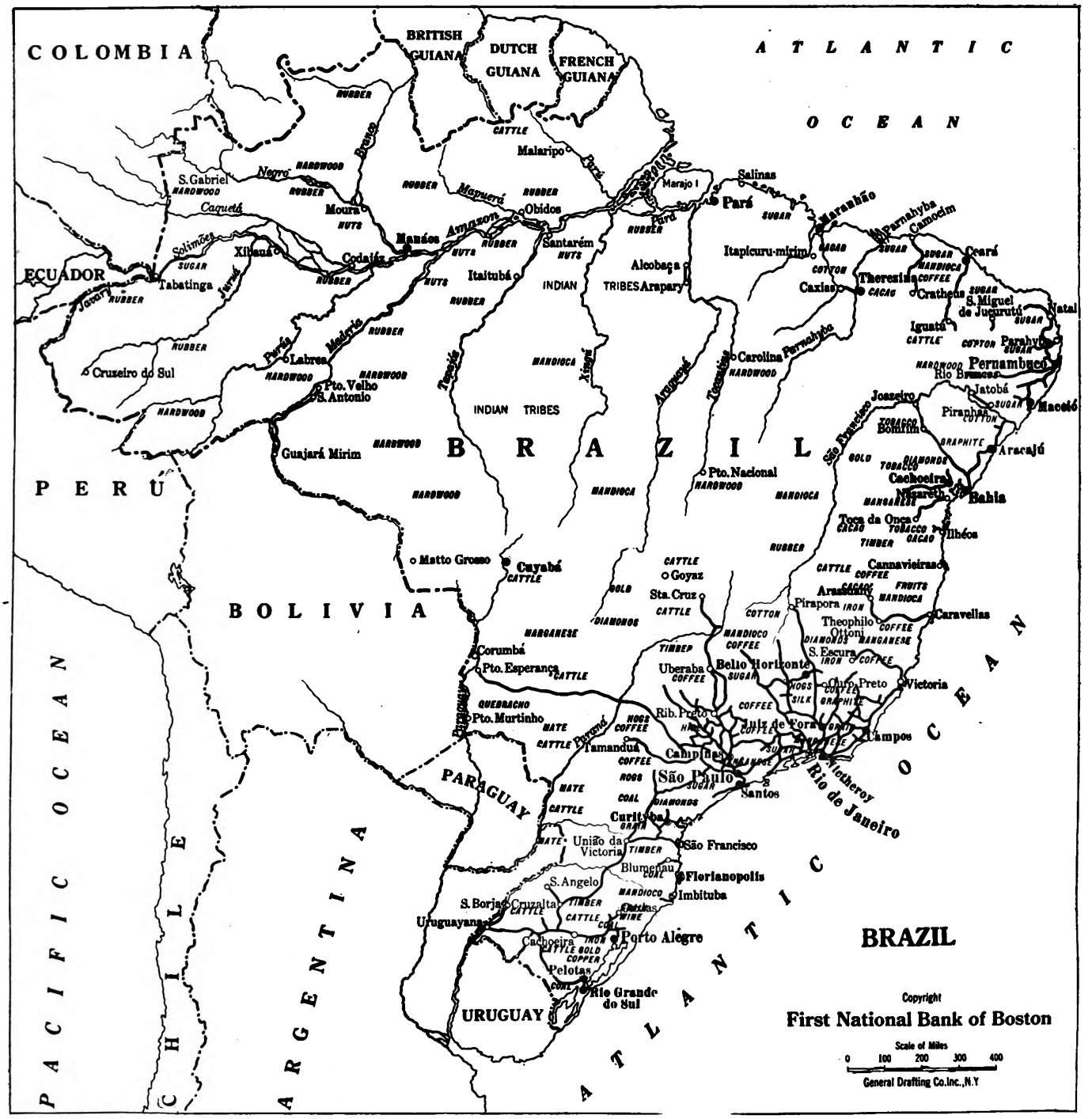
THE principal items which the United States sends to Brazil are machinery, which is now Brazil's chief import; flour, wheat and meal, in which Argentina is our chief competitor; coal, shipments of which in the past have also come in considerable quantities from Great Britain; railway materials; electrical machinery, in which Germany used to be our chief competitor; iron and steel products, in which trade Great Britain still shares and which was formerly enjoyed to a large extent by Germany; and petroleum products, in which trade we predominate. The proportionate shares of the United States and our chief competitors in the Brazilian import trade are shown in this table:

	1913	1919	1920
United States	15.7%	48. %	42.1%
Great Britain	24.5%	16.1 %	21.2%
Germany	17.5%	0.21%	5.0%
France	9.8%	3.79%	5.6%

The war, of course, has given us a tremendous advantage over France and Germany, and has also improved our position in regard to British competition.

Machinery is the Brazilian import which seems at present to hold out the greatest promise to American exporters. In value this item is the leading import of the country, and its value is rapidly increasing. Brazil's machinery imports jumped from 66,127,000 milreis in the first six months of 1920 to 151,134,000 milreis in the same period of 1921. (The milreis was quoted in New York at about 14 cents in the early part of July, 1922.)

This increase in machinery imports is a symptom of the growth of Brazil's manufacturing industries. The government has fostered these



Industrial map of Brazil showing the distribution of raw materials (slanting capital letters) and the many rivers that afford water transportation from the sea inland.

industries for many years, and they give promise of great development in the future. The mountainous nature of the country furnishes plenty of water power, which is gradually being impressed into use. The development of manufacturing has been greatly helped by the high protective tariff—the same institution which helped to destroy the supremacy of Brazil's rubber industry.

The products of Brazil's factories include textiles, cordage, furniture, white clothing, lumber and cabinet work, hats, umbrellas, shoes, soap, candles, chemical products, preserved food, seed, chocolate, biscuits, glass, paper and leather goods. Dairy products, lime and cement, wax, iron foundry products, tobacco manufactures, sugar, wines, agricultural implements, iron safes, stoves and matches are also produced in the small factories in some of the outlying states.

By far the most important manufacturing industry of the country is the cotton textile industry, in which about 40% of the total industrial capital is invested. Most of the mills are in the south, and the best are in the neighborhood of Rio de Janeiro. Water power is used extensively. The industry is dependent almost entirely on the high protective tariff.

The woolen mills of southern Brazil are also growing in importance. Large plants for weaving jute have also been established, and the manufacture of silk and linen has been undertaken in the past few years. Rubber-goods factories, cottonseed-oil works, and mills for extracting and refining oil from nuts have also been established recently.

Brazil is one of the best potential export markets of the United States. Our present trade with her is extensive, and seems to offer the prospect of profitable expansion. What can American exporters do to seize their opportunity?

(Turn to page 1319)

A New Plan for Charting Production

HOW can an individual, *without* the use of collected data and statistics depict business conditions in graphic form? (This, by the way, is not taken from the Edison questionnaire.) The average answer would be that it cannot be done. Yet it can and is being done and in no less a city than Cleveland.

The data compiled by statisticians are, in a measure, a gauge of the business transacted within the district to which the facts apply. The difficulty in statistical work, however, lies in the proper evaluation of one group of facts with relation to the whole group of facts. Further, the conclusions drawn from such correlated data represent more or less the personal judgment of the individual compiling the data.

A better means for presenting business conditions within a district is that used by the large central stations supplying electricity to such communities.

"It is well known among experienced engineers and manufacturers," says G. E. Miller, writing in *Trade Winds,* "that in a shop or manufacturing plant driven by electric power, the volume of finished product may be very accurately measured by the amount of electricity consumed in its production. For instance, the experienced manager of a steel mill can translate the kilowatt hours of electricity used in his mill over a definite period of time, into tons of steel rolled for the same period, with surprising accuracy. He is able to do this because the electricity used represents work done in making the finished product."

Wherever electricity is used, therefore, and when data are available over a sufficient period of time, the output of a plant may be accurately measured by the kilowatt hours of electricity used.

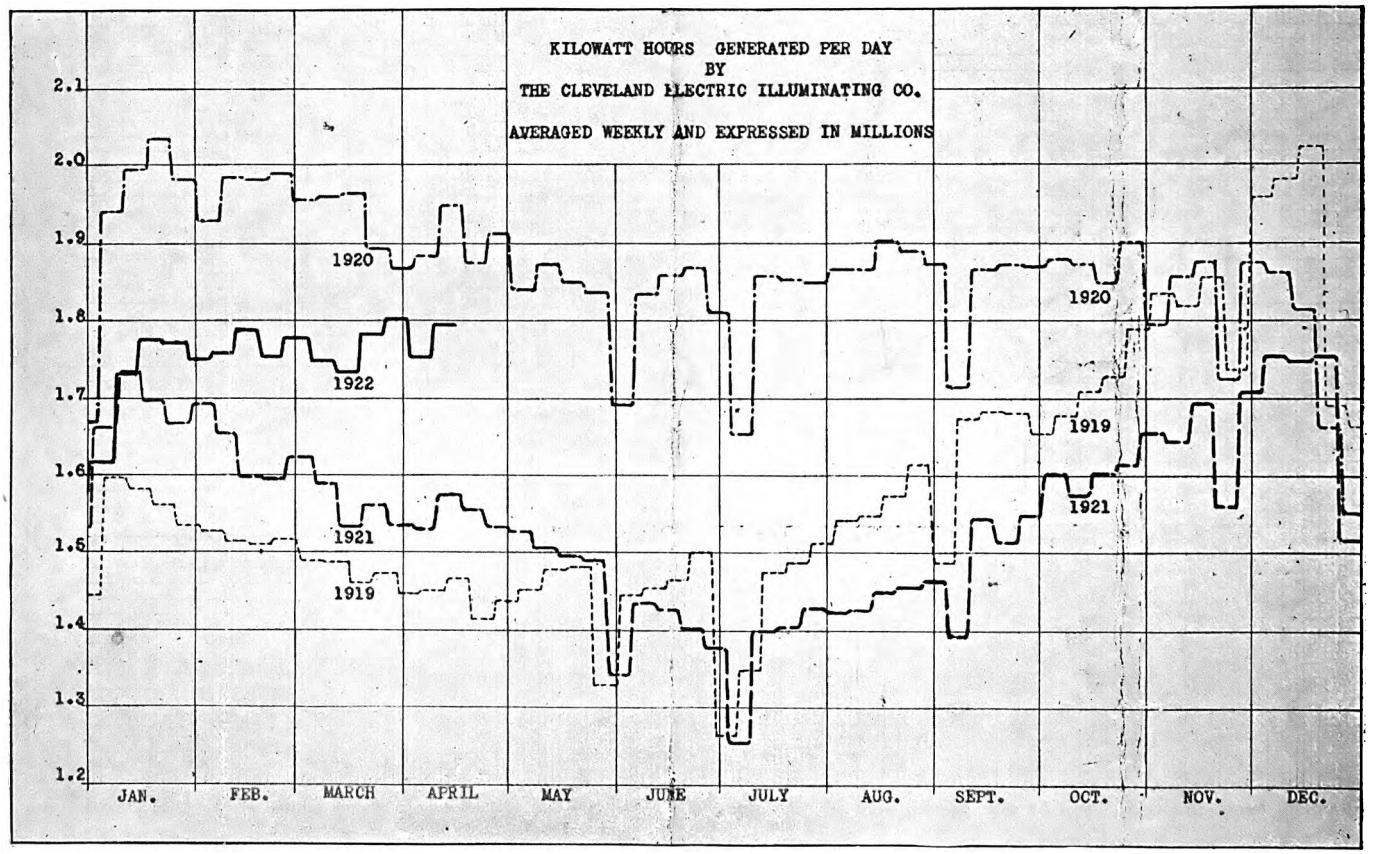
In Cleveland, a large industrial center where electricity is the main factor in driving the wheels of industry, the amount of finished products, during any period of time, can be judged very accurately by comparing the total amount of electricity generated by the central station with that generated in some other period.

It therefore follows that a study of the "load curves" of the illuminating company supplying most of the power used in Cleveland's factories and industrial activities may be of interest as representing the total kilowatt hour output from its power plants, and as indicating the trend of business in the near future.

Electricity, as compared with other forms of data, is a most trustworthy guide in determining business conditions. Take, for instance, the bank. The banker takes the dollar for his unit of measurement in gauging business conditions. But this can never be an accurate gauge since "the bank clearings of a particular day or week do not measure fairly the productive capacity of industry for that period, as obviously they may reflect business done by selling goods from stock when the plant producing the goods is completely shut down. Many other factors enter which make the dollar an untrustworthy unit of measure with which to gauge the industrial output of the community for any particular period."

On the other hand, kilowatt hours measure the work done today, and consequently goods produced today. "Electricity

(Turn to page 1319)



An example of the practical use to be made of charts. To a company selling electric current, power generated is a direct indication of production in the territory served. Even the best report with tabular data is still incomplete and is not thoroughly comprehensible unless accompanied by such charts clearly presenting the trend.

The New Styles in Letterature

"BUSINESS men today are getting entirely too clever for me," said Old Man Jarvis. "I can't keep up with them. In my day a manufacturer was just a manufacturer, and he left artistry to the artists and science to the scientists, contenting himself with making his product and selling as much of it as he could at the highest price he could get. But today a business man is also a psychologist, an economist and a literary artist; and if he can't be all three himself he hires others who can supply his scientific and artistic deficiencies.

"It's beginning to get on my nerves. I don't like to think I'm a back number, but I can't stand the pace that you youngsters are leading. I'm doing my best. I have a psychologist handling my advertising for me, and when he says to me, 'Mr. Jarvis, the psychology of our buying public demands that we start a campaign in every leading national magazine of the country to overcome the economy-complex instilled in the minds of the people by reaction from the post-war exuberance,' I try, as often as possible, to tell him to go ahead; and when the time comes to pay the bill I congratulate myself on being a modern, psychological business man. Likewise, I subscribe to an economic service that sends me charts looking like the cross sections of the Rocky Mountains in the school geographies, labeled: 'Fluctuations in the price of white lead fence paint during the panics of 1789-90 and 1883, correlated with a graphic representation of the production of wire nails in the United States from the close of the Cvil War to the present date. On the basis of this illuminating and instructive chart we advise our clients to buy all the suburban real estate they can lay their hands on.' I study all this material with the utmost care, glad to be among these progressive business men who call the science of economics to their aid.

"But the literary artistry of present-day business is too much for me. I can stand the psychology and the science, but not the literature. The other day I got the following letter from a firm that used to sell me goods.

'Universal Manufacturing Company

"'Buffalo, N. Y., July 1, 1922.

"'Dear Sir:

"'Jim Smith stood in front of the post office, wrestling with his chronic dyspepsia, just as the noon whistles sounded.

"'Twelve o'clock, eh?" he said, half to himself and half to an acquaintance. 'Well, I'm going home to dinner. If dinner ain't ready I'm going to raise hell; and if it is ready I ain't going to eat a bite.'

"Smith refused to be pleased any way you look at it.

"Fortunately for us, however, our customers are nothing like Jim Smith. Take your own case, for example? You have not been dealing with us for a long time, but——'

"The letter went on like that for a page and a half. I read it with tremendous interest, and was glad to see that there was no line at the end reading 'To be continued.' I wouldn't have been able to eat or sleep until the next instalment. It was a novelette.

"Frequently I am surprised by outbursts of literary skill from the most unexpected quarters. Not long ago a young fellow called on and tried to interest me in a line of goods such as we use pretty regularly. He wasn't such a bright young man. Indeed, I noticed that from time to time a grammatical error would creep into his selling talk. But the stuff he showed me seemed pretty fair, and I laid aside his card, intending to get in touch with him if we should ever have trouble with our present source of supply in his line. After his visit I occasionally received catalogues and notices of price revisions from his firm, and I put them away in my scientific filing system, without which no modern business office is complete.

All of a sudden I got a letter over the salesman's signature that opened with a lot of question marks:

Martian Aero Service Company

"'Philadelphia, July 7, 1922.

"'Gentlemen:

"'? ? ? ?

"'? ? ? ? ? ? ?

"'That's the way I feel about your account.

"'I've been angling for your business—exerting every possible effort to interest you in our lines—posting you at frequent intervals on new things and especially active items, that I felt sure should interest you.

"'But to no avail.

"'And on top of that I see, too, that the letter I wrote you the other day after Mr. ———— had grilled me on my inability to elicit as much as a reply from you to the many, many letters I have sent you, also remains unanswered.

"'Why? That's what gets me. Am I not entitled at least to the courtesy of a reply from you?

"'Let's just change places for a moment—if you knew and were sure that you were able to serve me as well, or probably a little better, than the next fellow—

"'If you know that the merchandise you were offering was absolutely right in price—

"'If you knew that I used your merchandise, and that you were in a position to give me immediate attention and service at all times. wouldn't you feel the same about it as I do?

"'Well, then, listen. What is it that prevents our getting together? Come right out from the shoulder. Tell me candidly and outspokenly just what's wrong. Are you dissatisfied with the manner in which we have taken care of your wants placed with us in the past, or is it simply a case of poor salesmanship on my own part?

"'That's not asking much, is it? What's wrong then?

"'May I hear from you by return mail via enclosed stamped envelope? Write on back of this letterhead if it's more convenient.

"'Yours for business, Jim Brown.'

"This sudden transformation of the ungrammatical salesman into an Arthur Brisbane was all the more surprising to me because his letter didn't exactly seem to apply to my case. The sentence asking me if I was dissatisfied with the manner in which he had taken care of me in the past was especially puzzling, because I had never bought anything from him. I continued to puzzle and to admire until one day I saw a familiar-looking row of question marks underneath the letterhead of another firm that was angling for my business. Reading ahead with interest, I saw that this firm had sent me an exact duplicate of the literary outburst of my ungrammatical salesman.

"That made it all clear. I perceived that the modern business man, in order to be thoroughly modern, not only must buy psychological service from the expert psychologists, and economic service from the expert economists, but letter-writing service from the expert literateurs. My ordinary, simple 'Yours-at-hand-and-contents-noted' letters which I had been dictating to my stenographer ever since the typewriter was invented were all wrong. I would have to buy a book of up-to-date, smoothly written, unusual, snappy and entrancing model letters, and base my correspondence on that.

"But I'll be hanged if I will. I'll keep up with the times in everything but that. I'll write my own letters in old-fashioned, brief, understandable business English, and whenever a work of literary art comes to me on the letterhead of a business contemporary I'll mail it to my friend the editor of 'The Literary Review,' to whom it should have been sent (with stamped and self-addressed envelope) in the first place."

Uniform Traffic Signals Coming

THE day is not far off when red, green and yellow, when used as traffic signals, will each have its distinctive meaning, and this meaning will be uniform all over the country, according to the decisions reached at the first fully representative conference ever held on the subject in this country. When that day arrives the annual toll of deaths and serious injuries resulting from traffic accidents will be reduced by the elimination of accidents caused by the confusion or misunderstanding of signals. This conference on the standardization of colors for traffic signals was recently held in New York under the auspices of the American Engineering Standards Committee. There were present representatives of practically all of the big national engineering societies, safety associations, electric and steam railway interests, automobile dealers, manufacturers and users associations, police and traffic departments, insurance companies, and several departments of the federal government.

The conference agreed unanimously "that there should be national uniformity in the use of colors for signals," and that the detailed technical work involved in bringing about such uniformity should be carried out by a thoroughly representative sectional committee under the auspices and procedure of the American Engineering Standards Committee. Included in the scope of the work as defined were the following:

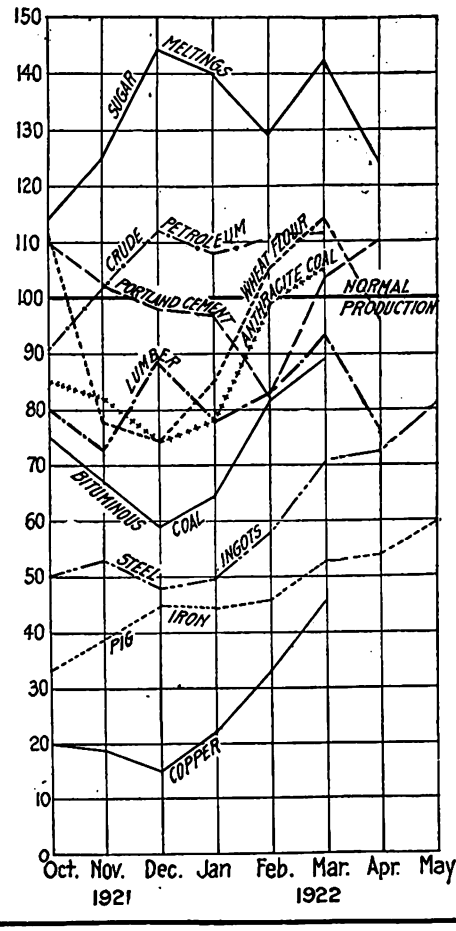
The use of colored lights on all highway vehicles; their use on all signals along highways and at curves, both permanent and temporary; their use for highway crossing signals for steam and electric railways; a coordinated relation of color, form, position and number of signals; a coordinated relation to systems of flashing, moving or other similar lights; colors for non-luminous as distinguished from luminous signals; recommendations on the use of colors for emergency exit signals; methods of specifying or defining colors for signals purposes; any other closely related matters which, in the opinion of the sectional committee, form a part of the subject to be considered.

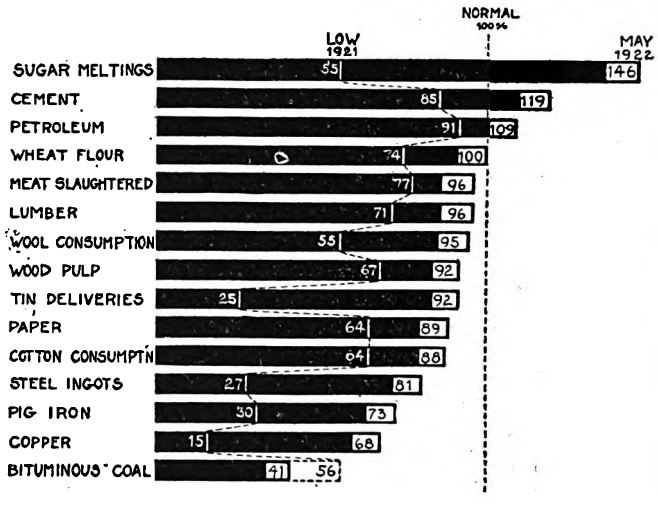
It is very easy to place the entire responsibility for automobile accidents on the automobile driver while, as a matter of fact, the responsibility for conditions which exist rests not merely on the motorist, but also on the pedestrian and upon the steam and electric railways.

Pedestrians often cause automobile accidents by ignoring traffic rules. Watchmen are not always at grade crossings when the signs say they should be there; and grade crossing gates are, at times, down for considerable periods when trains are not going through. National uniformity in colors for traffic signals is extremely desirable, but if major changes are to be made—as, for example, a change in the color of tail lights for automobiles—it would take at least two years to get such changes into operation because legislation would be required in most states.

On the motion of Dr. M. G. Lloyd, of the U. S. Bureau of Standards, a resolution was adopted declaring it to be the sense of the conference that any sectional committee of the E. S. C. which takes up the standardization of colors for signals should endeavor to coordinate such standardization with existing standards for traffic purposes, such as those used in water and aerial navigation and on steam and electric railways.

Production Figures Are Approaching Normal



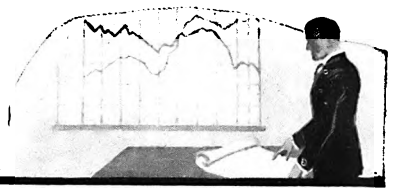


Production of basic commodities in May, 1922, and the low point in 1921 compared with normal production. In cases in which May production figures are not available, April figures are shown.—*(Federal Reserve Bank, New York.)*

Monthly production of selected commodities expressed as percentages of estimated normal production.—*(The Iron Age.)*



THE TREND
—in facts and figures



Basic Commodity Prices

(Minimum, at New York, unless otherwise specified)

	Week Ending July 15	Week Ending July 8	Year Ago
Aluminum, pig (ton lots), lb.	.17	.17	.225
Antimony, ordinary, lb.	.0575	.0575	.05125
Brick, Hudson R., per M.	21.00	21.00	15.00
Cement, Portland, bbl.	1.70	1.70	2.15
Copper, Electrolytic, lb.	.14	.13875	.1275
Cotton, spot, Mid. Upl., lb.	.2265	.2290	...
Hides, Chic. Pack., No. 1, lb.	.175	.17	.13
Lead, N. Y., lb.	.0575	.0575	.045
Petroleum, cr., at well, bbl.	3.50	3.50	2.25
Pig iron, Bessemer, Pgh., ton	26.77	26.77	22.96
Pine, roofers 6 in., M. ft.	33.00	33.00	28.00
Rubber, Up River, fine, lb.	.1875	.18	.1575
Silks, Sinshui, No. 1, lb.	7.35	7.50	6.00
Spelter, N. Y., lb.	.0605	.0580	.0455
Steel Billets, Bess., Phg., ton	35.00	35.00	33.00
Tin, N. Y., lb.	.31	.3150	.28
Wool, Dom., ½ blood com., lb.	.50	.50	.30

Wholesale Commodity Prices

Coal—			
Bit., ¾ in., lump, net ton	...	...	...
Anthracite, egg, net ton	...	...	...
Coke, furnace, net ton	9.50	8.50	2.75
Cotton Goods—			
Brown Sheetings, Std. yd.	.13	.13	.0925
Standard Prints, yd.	.1025	.1025	.11
Print Cloths, 38½ in., 64x60, yd.	.0875	.08625	.065
Drugs and Chemicals—			
Alcohol, ethyl, form 5, gal.	.30	.30	.37
Alcohol, wood, 95%, gal.	.57	.57	.85
Alum, lump, lb.	.0325	.0375	.0375
Bleaching Powder, over 34%, 100 lbs.	1.60	1.60	2.15
Borax, crystal, in bbl., lb.	.06	.06	.06
Caustic Soda, 76%, 100 lbs.	3.75	3.75	4.10
Lime, factory, 200-lb. bbl.	1.90	1.90	...
Nitric Acid, 42°, lb.	.065	.065	.07
Saltpeter, crystal, 100 lbs.	.0775	.0775	.1075
Soda Ash, 58% light, 100 lbs.	1.75	1.75	2.00
Sulphuric Acid, 60%, 100 lbs.	.50	.50	.60
Flour—			
Spring Pat., 196 lbs.	7.50	7.50	9.00
Winter, soft str't, 100 lbs.	5.50	5.50	6.50
Grains—			
Wheat, No. 2 Red, bu.	1.305	1.315	1.465
Corn, No. 2 Yellow, bu.	.83	.8425	.8475
Oats, No. 3 White, bu.	.465	.4650	.485
Rye, No. 2, bu.	.9575	.9850	1.48
Barley, malting, bu.	.74	.74	.82
Hay, No. 1, 100 lbs.	1.60	1.55	1.50
Straw, lg., rye, No. 2, 100 lbs.	2.00	2.00	1.10
Hides—			
Cows, heavy native, lb.	.165	.165	.11
Country, No. 1 steers, lb.	.13	.12	.08
Iron and Steel—			
Basic, Valley furnace, ton	24.00	25.00	19.50
Steel bars, Pittsburgh, 100 lbs.	1.70	1.70	1.90
Beams, Pittsburgh, 100 lbs.	1.70	1.70	2.00
Galvanized Sheets, No. 28, Pittsburgh, 100 lbs.	4.15	4.15	4.50
Leather—			
Hemlock, sole, No. 1, lb.	.20	.29	.28
Scoured oak backs, No. 1, lb.	.45	.45	.55
Lumber—			
FAS Qtd. Wh. Oak, 4/4" M. ft.	145.00	145.00	145.00
Tonawanda Wh. Pine No. 1 barn 1x4", M. ft.	82.00	82.00	90.00
Adirondack Spruce, 2x4", M. ft.	38.00	38.00	48.00
No. 1 Com. Y. Pine Bds., 1x4", M. ft.	44.75	44.75	37.00
Oils—			
Coconut, spot N. Y., lb.	.085	.085	.1025
Crude, tks, f.o.b. coast, lb.	.06875	.06875	.08
China Wood, bbls., spot, lb.	.1275	.13	.15
Cottonseed, lb.	.1150	.115	.0865
Linseed, city, raw, gal.	.95	.95	.76
Paraffine wax, ref., 125 m. p., lb.	.035	.035	.035
Turpentine, gal.	1.18	1.19	.675
Paints—			
White Lead, in oil, lb.	.125	.125	.13
White Lead, dry, lb.	.0725	.0725	.075
Zinc., Amer., lb.	.075	.075	.075
Paper—			
News roll, 100 lbs.	3.50	3.50	5.00
Book SS. & C., lb.	.0625	.0625	.0775
Wood Pulp, ton	75.00	75.00	80.00
Sugar—			
Cent. 96°, 100 lbs.	4.93	4.79	4.375
Fine Gran., in bbls., 100 lbs.	6.50	6.40	5.60
Wool—			
Boston Aver. 98 quot., lb.	73.98	74.01	40.20
Stand. Clay Wor., 16-oz., yd.	3.725	3.725	2.85
Fancy Cassimere, 13-oz., yd.	2.45	2.45	2.125
Serge, 36", Wor., yd.	.52	.52	.52
Broadcloth, 54", yd.	2.75	2.75	2.50
Cottonwarp serge, 36", yd.	.45	.45	.45

Financial

Bank Clearings	Week Ending July 15	Week Ending July 8	Year Ago
New York	$4,346,674,088	$4,070,698,532	$3,480,174,646
Chicago	554,678,618	505,445,125	504,444,150
Entire Country	7,872,000,000	7,168,000,000	6,614,000,000
Increase or Decr.	+19.02%	+26.8%	—26.8%

(Per cent of total from preceding year)

Cost of Money—New York	Week End. July 15	Week End. July 8	Year to Date	Year Ago
Call Loans	4½@2¾	5@4	6@2¾	6½@5½
Time Loans (60-90 days	4¼@4	4	5@3½	6
Six Months	4½@4¼	4	5@3¾	6
Com.Discount,4-6mos.	4¼@4	4¼@4	5@4	6½@6¼

Financial Transactions	Week Ending July 15	Week Ending July 8	Year Ago
Stock Sales, shares	3,720,721	2,943,203	2,002,622
Aver. Price, 25 Railroads	64.54 h. 63.00 l.	65.25 h. 61.83 l.	53.16 h. 51.82 l.
Aver. Price, 25 Industrials	99.53 h. 97.12 l.	99.10 h. 96.64 l.	73.48 h. 71.78 l.
Sales of Bonds, Par Value	$79,961,800	$71,777,600	$52,721,600
Aver. Price, 40 Bonds	80.93 h. 80.44 l.	80.56 h. 79.96 l.	69.56 h. 69.29 l.
Average Net Yield, 10 High-Grade Bonds	4.430%	4.485%	5.430%
New Security Issues	$38,120,000	$83,460,000	$14,775,000

Business Failures	Week End. July 13	Week End. July 6	Year Ago
Number	455	306	324
	June, 1922	Six months	June, 1921
Liabilities	$38,242,450	$373,716,338	$34,639,375

Industrial

Building Permits	June, 1922	May, 1922	June, 1921
Cities	$258,674,449*	$228,875,188†	$127,671,278*

*141 cities. †156 cities.

Idle Freight Cars	June 15, 1922	May 31, 1922	May 8, 1922
Number	442,253	486,846	528,308
Car Loadings	July 1, 1922	June 17, 1922	May 27, 1922
Number	876,896	860,722	821,121
Steel and Iron Barometer	June 30, 1922	May 31, 1922	June 30, 1921
U. S. Steel Orders (tons)	5,635,531	5,254,228	5,117,868
Daily Pig Iron (Prod.) tons	78,701	74,409	35,494
Monthly Pig Iron (Prod.) tons	2,361,028*	2,306,679†	1,064,383*

*Month of June. †Month of May.

Foreign Trade	June, 1922	May, 1922	May, 1921
Exports	$334,000,000	$308,000,000	$329,709,579
Imports	260,000,000	254,000,000	204,911,186

Structural Steel Awards—Total sales for May, 146,900 tons, at the rate of 92% of capacity. Sales for April 165,900 tons.



The Situation in Europe

CONSIDERABLE attention is being paid in the financial markets to the European situation. Foreign exchange and the prices of the bonds of certain European countries, especially France and Belgium, showed weakness as a result of discouraging news from the conference at The Hague and from Central Europe. Speculators for the decline took advantage of the unfavorable reports, and drove prices in these markets temporarily lower than the news really warranted.

The chief reason for the decline in French and Belgium bonds was the talk of a moratorium on German reparations. The reparations situation is enveloped in uncertainty, but many observers think that the outcome will not be entirely unfavorable. A reduction of the payments that Germany is required to make will certainly not be favorable to France, but it may have a beneficial effect on the international financial situation taken as a whole. The Reparations Commission, apparently with the consent of France, has already agreed to reduce the July payment by 36%, and it is hoped that France may permit further concessions on the ground that it would be better to collect less money than she expected now than to bring about a political and economic upheaval in Germany. It is quite possible that the present crisis may result in an arrangement which will make possible the calling of another meeting of bankers to consider a loan for Germany's benefit.

Low Marks and Markdowns

THIS hope did not prevent the German mark from tumbling lower than ever before. The issuance of paper money in Germany goes merrily on, in spite of strikes, assassinations and threats of revolution that interrupt the functions of every economic agency of the country except the government printing presses.

In this connection a reported action of the Russian Soviet Government is interesting. The Soviets, it is said, have reduced the number of rubles in circulation by eliminating the last four ciphers from the outstanding ruble notes. In other words, a note for 10,000 rubles is now a note for only one ruble, and the 75,000,000,000,000 rubles formerly in existence have been reduced to 7,500,000,000. The *New York Times* remarks that "this scaling down is nothing other than repudiation and it emphasizes the fact that the Soviet Government is in a precarious situation.

Hot Weather Dulls Stock Market

THE stock market is afflicted by hot-weather dullness. Highly speculative stocks are rising and falling as the result of professional operations, and the list as a whole is holding up well. Observers say that the situation shows strength.

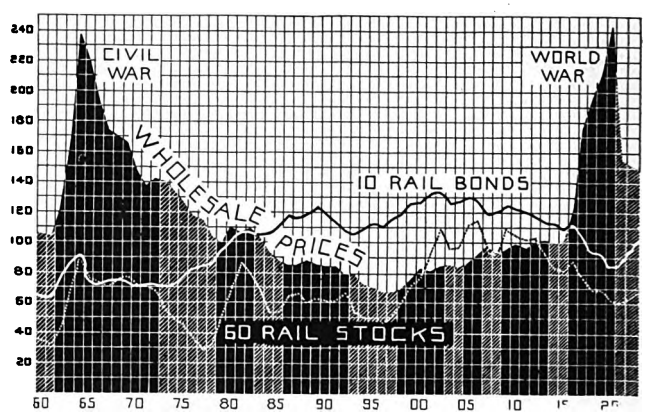
"Strong financial interests, which have been applying severe analytical tests to the market, are greatly impressed with its resiliency," writes S. S. Fontaine. "They do not hesitate to express the opinion that, with the satisfactory completion of the harvests, particularly if an ample corn crop is garnered, we shall have a notable movement in securities during the Fall and early Winter. They admit that the reasonable assurance of these desirable developments may lead to an anticipatory movement during the summer.

"It is significant that some of the more farsighted market leaders are planning to spend the greater part of the vacation period in closer touch with the Stock Exchange than has been their practice in recent years."

Bonds Show Good Health

IN spite of the weakness in certain foreign bond issues the bond market as a whole is in extremely good shape. The *New York World* points out that in response to the reinvestment demand created by distribution of July interest and dividends the major portion of the bond market early in the month reached the highest average level of the year and the highest on the recovery from 1920 and 1921 low points. Liberty 4¼% issues made new high records, with the exception only of the second converted bond of the first loan. High grade railroad bonds were in strong demand and limited supply; standard rail, public utility and industrial issues were well absorbed; and the cheaper bonds also were inclined to higher levels. The higher grade of securities made the greatest gains, because funds for reinvestment naturally flow into such channels.

Underwriters of new bond issues were encouraged to bring out large volumes of securities, and they had little difficulty in getting rid of their wares at good prices. State and municipal bonds continued to be sold in considerable



Wholesale prices from 1860 to 1922, the prices of 10 rail bonds, and 60 rail stocks (crosshatch bars indicate years of depression).—*(L. P. Ayres, Cleveland Trust Co.)*

quantities. Compilation of the records for June showed that an aggregate par value of $154,273,633 permanent State and municipal bonds were successfully marketed in that month. This brings the total for the year up to $713,070,097, according to a table compiled by the *Daily Bond Buyer*. If as large a volume of this kind of financing is done during the remaining six months of the year the record total of 1921 will be exceeded. Advance reports, however, do not indicate that borrowing will be maintained to the same extent during the summer or even after the elections in the fall. If these reports are correct industrial and railroad corporations will be relieved of a part of this competition in the investment market.

Belgium a Good Cotton Market

IT is believed that a sustained demand for American cotton in Belgium is practically assured as a result of the improved condition of the cotton textile industry in that country. During the first quarter of 1922 the value of imports of American manufactured products decreased 50%, but imports of American automobiles, starch, paints, paper and hardware showed noticeable increases.



Unemployment Period Nearly Ended

THAT the period of labor liquidation is rapidly drawing to a close is indicated by the chart shown below. Although wage reductions are still in progress throughout the country they are being counterbalanced in many sections by wage advances. Employment statistics throughout the country indicate that the period of unemployment is practically closed. While a surplus of unskilled labor is found in Portland and Seattle, Washington; St. Paul, Minnesota; and Albany, N. Y., nearly all localities report increasing employment in practically all lines and many even report shortages of workers.

It is believed by some students of the labor problem that the curtailment of immigration is responsible for the labor shortage. If this is the case it will probably result in a relatively higher wage for unskilled labor, which will mean an increased cost of production for those industries in which common unskilled labor is an important item.

Million and a Quarter Men Idle

ACCORDING to the *Industrial News Survey* of the National Industrial Conference Board, nearly 1,240,000 persons are now idle because of strikes in various industries. It is estimated that it would require the labor of 100 men working for over 30 years of 300 week days each to make up for the time lost for each week of idleness. Moreover, it must be remembered that this loss includes only those who have voluntarily left their employment. If the strikes continue a large number of persons engaged in secondary or allied industries dependent on the major industries will be forced into involuntary unemployment.

Labor's Food Bill

A REVISION of the index numbers showing changes in the level of wholesale prices has recently been made by the Bureau of Labor Statistics. This revision consists in regrouping the commodities, the addition of a number of new articles, and the substitution of the 1919 census data for weighting purposes instead of the 1909 census data previously employed. The index figures, as thus revised, show for "all commodities" an average of 148 for May, 1922, as against 143 for April, or a rise of five points in a single month.

However, this index of wholesale commodity prices does not furnish a basis for determining wages, since the worker does not buy at wholesale but at retail. And in the case of rent and fuel, particularly, there has been no appreciable drop in price. . In spite of the fact that the dollar purchases more than in 1920, its purchasing power is still below that of 1914, consequently wages today are, in reality, only slightly higher than they were at that time.

R. R. Wage Bill Reduced

A RECENT report of the Interstate Commerce Commission states that the railroads of the United States in April of this year paid $203,413,071 in total compensation to 1,578,133 employees. This is at the rate of $128.89 to each employee. While this was an increase of 7,975, or one-half of 1%, over the number of employees reported for the preceding month, the total wage bill was decreased, compared with the preceding month, by $13,291,337,—or 6.1%, owing to a reduction in the number of higher-paid employees.

Labor Banks and Newspapers

TWO of the most important developments during recent years among labor organizations have been the formation of labor banks and the inauguration of press associations for the service of labor newspapers. The fact that labor organizations need sound financial backing during a strike is obvious. Many labor leaders claim that one of the reasons why labor has lost in many of its struggles during past years appears to have been due to the fact that organized financing and a well-developed newspaper service have been almost wholly lacking. But labor unions are at last realizing that numerical strength alone does not always mean power, and instead of dwelling upon the necessity of securing new members they are bending every effort to the reorganization of their resources.

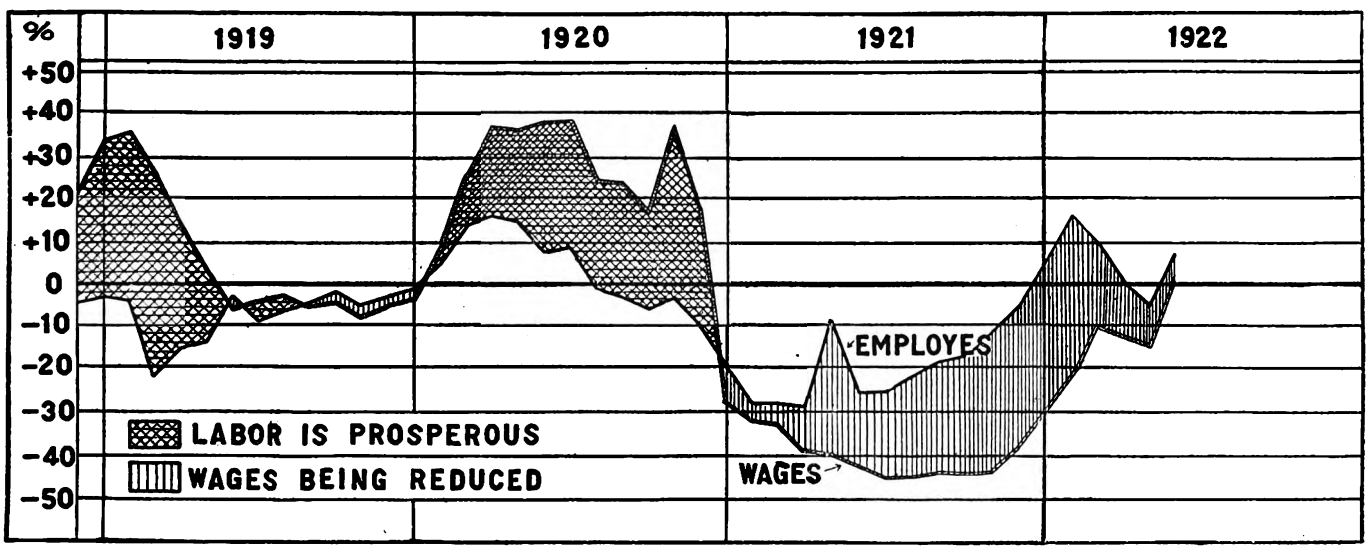


Chart compiled from figures of Bureau of Labor Statistics, showing percentage increase or decrease in employment and wages, compared with same months of year preceding. Aggregate numbers employed and wages paid in identical establishments are used in compilation. Black areas are periods of labor prosperity when per capita wages were increasing. Shaded area, now developing, indicates extent to which tide is swinging away from labor.—*(United Business Service.)*



IN THE MANAGER'S OFFICE



Industrial Production Principles

SAMUEL CROWTHER, in *Factory,* describes four principles of production which Henry Ford regards as basic. These principles, as applied in the Ford plants, are: (1) No process, no method, is ever considered as having been perfected. It is considered as in use only until a better method is devised. Therefore the attention of everyone is fixed upon doing the thing better and there is never an opposition to change. A good deal of the difficulty which attends the introduction of a new method in the average plant is that which is due to the opposition of those who want to let well enough alone;

(2) The foreman in charge of a particular operation does not bother with costs. He does not know the costs. His department gets its score from the number of pieces produced per day divided by the number of man hours worked. His rating depends upon decreasing the human labor content of the pieces produced by his department. Therefore he is eager for every improvement that will increase output;

(3) The department heads and foremen are not bothered with cost sheets for the elementary reason that most of the costs are beyond their control. A department head cannot control wages or the cost of material or administrative overhead. Therefore the position is taken that he should not be bothered with figures he cannot alter. His mind should not be diverted from what he can control to what he cannot control. He can control the unproductive ratio in his department, and he can control the output per man, and these are the figures that show in his score;

(4) In the accounting no charge is made for interest upon the investment. This is a fundamental point in Mr. Ford's theory of business. The whole plant is considered merely as a productive tool and it is worth what it returns in the way of production. The process is not complicated by considering what might have happened had the money, instead of being put into a productive tool, been put into 6% securities. That is to say, interest upon the investment is not taken into consideration anywhere in the accounting of the company.

Making a Sales Budget

USING the sales quota as a basis for the plant budget is described by A. J. Lutterbach in *Business.* The sales budget provides a plan of general action toward a specific goal, sets a selling pace for the men in the field and establishes a guide for executive control.

The first step toward the establishment of a sales budget for the year is to determine the objective. Some of the factors to be considered are general business conditions, past, present and anticipated; last year's volume and the ease or difficulty with which it was attained; and the attitude of the buying public. After analyzing these and other factors the desired percentage of increase in sales is determined. The next step is to allocate the increase to the various divisions and territories.

Where more than one commodity is produced a ratio of increase is determined for each product. This ratio is allotted to each department and becomes the departmental quota. The new quotas are based to a large extent on past performance as revealed by the classified record of sales.

Having established and distributed a quota to the goods to be sold the next consideration is the quotas of the men who will sell these goods. After careful analysis individual quotas are set up and the district managers advised of the amount of sales expected from each of their men during the ensuing year. A salesman is required to sell a certain minimum number of units; that minimum is his "commission quota." When he has sold that number he begins to draw commissions on further sales of the product. When a district falls behind, or when a commodity slumps in sales, an investigation follows and measures are taken to insure the attainment of the quota.

To sell goods the company must first make goods and the factory determines how much to make from the sales budget. To finance the operations, meet expenses, procure raw material and secure money for extending manufacturing facilities, the financial department must know the anticipated load. This information is obtained from the sales budget. For each department in the plant the budget is divided and allotted just as the selling quota was allotted, to the individual commodities.

For computing the advertising budget the basis is again the selling quota. Every article carries a fixed advertising charge. This charge, multiplied by the number of units to be sold, establishes the total to be spent for advertising.

Trade Acceptances and Production

THE relation of the use of trade acceptances to the problems of the production department may seem remote but in reality this method of collection has advantages which accrue to every operating department, especially in industries of a seasonal nature. Arthur H. Little, in *Business,* outlines the experience of the tire industry which, to a large extent, utilizes the trade acceptance to stimulate production and sales in the dull months. Some of the benefits derived are:

(1) For the smaller companies the trade acceptance has made available as operating capital hundreds of thousands of dollars that otherwise would have lain in the hands of customers;

(2) By facilitating sales well in advance of the seasonal demand, the trade acceptance has made it possible for the factories to keep operating in the dull season at a volume well above the minimum which would compel increases in price;

(3) By stimulating the movement of goods in slack seasons, the trade acceptance has disposed of output that otherwise would have piled up in warehouse storage and simultaneously has prevented the confusion and congestion resulting from a rush of shipments at the beginning of the peak season;

(4) By reducing to the terms of a written understanding the relationship between seller and buyer, the trade acceptance tends to safeguard collections; and by simplifying for the manufacturer the work of collections and for the buyer the procedure of selling, it facilitates the settlement of accounts;

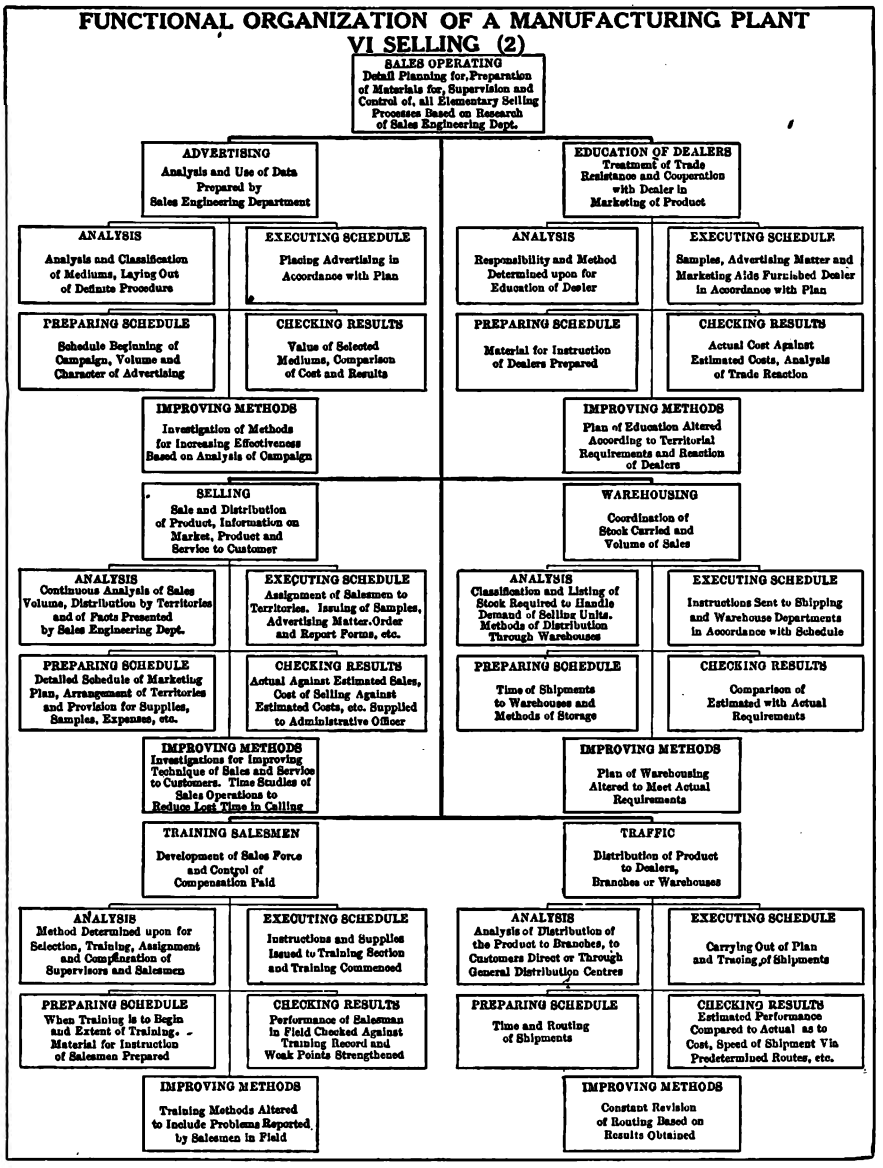
(5) By systematizing his buying, the trade acceptance serves the buyer; it enables him to prepare in the dull season for the demand of the peak and to fill out his stock with goods for which he can pay as he sells them.

Organization Charts

EDITORIAL comment in *Industrial Management* attributes part of the general misconception of organization to the organization chart fad. Organization charts are helpful or dangerous, depending on the use to which they are put. Such charts help to reveal the shortcomings in the existing organization and to clarify the relationships between individuals,

departments and functions. In so doing they help managers to understand and handle their organizations. But the present tendency is to recognize the chart as the important thing, the organization itself secondary.

The trouble does not come from drawing or having a map of the existing organization. The trouble with the organization chart lies in the attitude of mind regarding the conception of it as a finality. Frequently future growth is planned too strictly on the basis of the existing structure. Healthy growth almost invariably means continual and sometimes radical structural changes. When an organization and its future development are rigidly mapped on paper, there is a tendency to regard it as a fixed and final plan to stick to it long after the profitable and expedient time.



Functions of a Typical Industrial Plant

This chart is sixth in a series based to a large extent on lectures given at the Bureau of Personnel Administration by Warren D. Bruner.

Most organization charts do not provide for a crisis requiring contraction. The organization is made flexible only in the direction of growth. Flexibility and adaptability are two of the most necessary qualities for the successful executive, and in charting a plan of organization the idea of finality must be dispelled and provision made for either expansion or retraction, as conditions warrant.

A Material Control System

WHEN capital is in the form of cash it is carefully protected, its receipt and disbursement safeguarded and its custodians held to a strict accounting, but once this capital is converted into materials there is a tendency to become lax and to tolerate practices that are wasteful, inefficient and needlessly expensive. The summary given below of advantages of a material control system is taken from a paper by Arthur Lazarus, of the Chamber of Commerce of the United States.

In the first place, a stores control system should aid in keeping the investment in materials and supplies to a minimum consistent with efficient operation. The supply of specific commodities on hand is largely regulated by conditions of purchase, production and demand. An attempt should be made to avoid a needless variety or a surplus of stock by a study of standard sizes and varieties. The selection of odd sizes and kinds frequently rests on the judgment of an individual rather than upon sound industrial practice. An efficient material system will tend to eliminate distinctions that are not differences and to reduce the inventory to a minimum.

The second requirement of an adequate stores system is to supply men and machines with material in the manner, at the time, and in the amount desired. The investment in materials must be kept low, but not so low as to interfere with production. Parts must not only be physically available in the storeroom, but must converge to the point desired in production at the proper time. An undue accumulation of material in the course of production will seriously interrupt the flow of work.

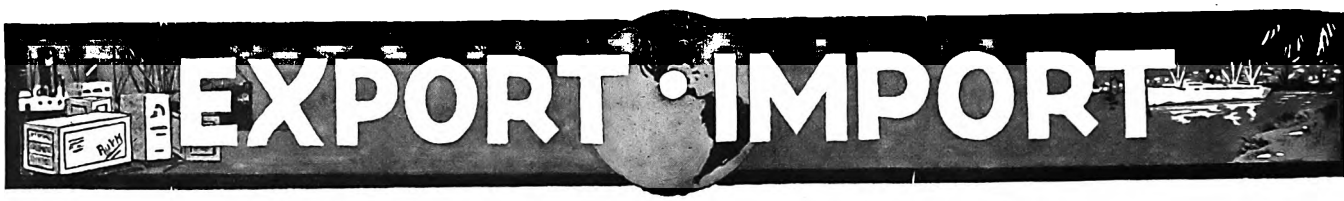
The third service of the stores control system is a proper conserving of the material investment. This involves checking incoming material for amounts, quality and condition, placing material where it can be readily found and safeguarding stores against accident and theft.

A fourth advantage arises from the use of the perpetual inventory, frequently checked by actual tests of quantities on hand, which makes unnecessary the expensive, burdensome and inaccurate annual physical inventory, with its general disorganization of the general routine and the shutting down of the plant.

Fifth, a stores control system is an essential part of accurate accounting for material, affording a comparison of actual material receipts with purchase requisitions and a class of dependable information making possible an accurate allocation of the actual cost of material to the proper departments, jobs or processes.

Again, a well-planned stores system will economize storage space. This is of extreme importance to businesses that are expanding and must utilize all available room. The remaining advantages are that records prepared prove invaluable in case of fire loss and provide against the accumulation of obsolescent material.

To a large degree the success of the stores control system depends on the cooperation of foremen and workmen. The control of material does not end with the storeroom or its records; it is a factory problem requiring the hearty cooperation of all the operating departments, and consequently should have the close attention of the directing executive.



Imports to Beat Tariff

THE anticipation of a high tariff appears to have had a remarkable effect upon the importation of various articles on which it is expected a high duty will be levied. According to a recent statement of the Collector of the Customs at New York, the fiscal year ended June 30 has been a banner year in the history of the Customs Department. The receipts are said to have exceeded all previous records.

The actual total for the year ended June 30, 1922, was $229,548,244 as against $229,325,365 last year. Compared with last year it showed the following result:

	1921	1922
Duties collected on mdse.	$205,863,858.81	$223,662,911.20
Misc. receipts	5,949,890.75	3,995,367.08
Total	$211,813,749.56	$227,658,278.37

The principal imports were raw materials for use in manufacture, foodstuffs, fabricated products for use in manufacture and goods ready for the ultimate consumer. The following table shows the duties collected on merchandise imported into this country during the years of 1920, 1921 and 1922:

Duties Collected

	1920	1921
July	$ 21,468,214.25	$ 13,443,166.86
August	18,392,047.35	15,237,808.03
September	16,140,523.89	15,203,273.17
October	16,845,472.10	15,657,372.60
November	15,335,704.46	17,078,066.41
December	12,190,678.56	16,799,062.74
	1921	1922
January	$ 12,265,070.19	$ 19,322,717.46
February	14,154,348.68	21,620,779.84
March	18,615,006.10	24,650,402.81
April	26,838,089.11	20,639,379.75
May	17,221,669.64	20,909,658.41
June	16,397,034.42	20,101,223.21
Total	$205,863,858.81	$223,662,911.29

Automotive

THE smaller export organization, because of its more intimate relation with the foreign market, actually accomplishes more, in proportion to its expense than large, cumbersome organizations. The automotive industry has found this out through its experience in the last two years. Although the records established in 1920 have not been equaled in 1921 the basic strength of the industry is reflected in the increase of both production and exports in 1921, compared with 1913.

It is reported that there are great possibilities for the use of tractors in India. Some of the provincial governments are demonstrating the various uses of tractors to farmers, large tracts of land frequently being plowed free of cost. Several makes of American tractors are now in use in India and are said to be proving quite satisfactory.

Electrical

TELEPHONE and telegraph equipment will be the principal material to be purchased with the £8,000,000 which has recently been placed at the disposal of the Postmaster General of the Treasury Department of the Federal Commonwealth Government. The American trade commissioner at Melbourne is preparing to forward to the Bureau of Foreign and Domestic Commerce all tenders and proposals for construction work in connection with the expenditure of this money, notice of which tenders will be distributed by the Electrical Equipment Division through the various district and cooperative offices of the bureau.

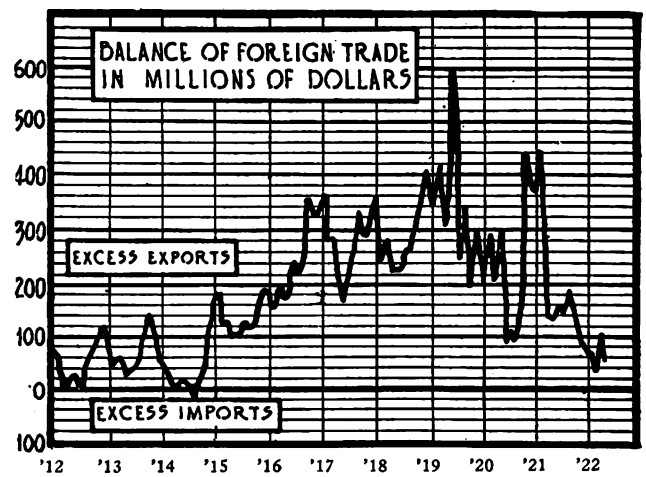
Leather

THE United States export figures for May, 1922, show an increased demand for American-made leather boots and shoes, the exports during the month being 515,373 pairs. The total number of pairs exported represent an increase of 20.1% over the average for the preceding four months.

The quantity of leather belting exported from the United States to various foreign countries during May, 1922, was 79.5% greater than that exported during May, 1921. The most pronounced increases occurred in shipments to Canada, Cuba, British India, China, and Argentina.

Iron and Steel

ALTHOUGH the market for American iron and steel products in Rumania was comparatively small before the war, owing to the preference for German and Austrian metallurgical products, German iron and steel exports to Rumania within the last few weeks have shown a considerable falling off. At the present time it is estimated that Greater Rumania needs some 650,000 tons of iron and steel products, most of which must be imported. The products and articles chiefly



The balance of foreign trade in millions of dollars, 1912-1922.
—(Magazine of Wall Street.)

imported are pig iron, iron in bars and sheets, construction iron, tank steel, soft steel, corrugated iron sheets, tin plate, galvanized iron sheets, iron pipe, wire rope, rolled iron, rails and various kinds of machinery and tools.

Lumber

THE importation of oversea timber through Hamburg during the past year has been favorably influenced by a number of factors, especially by the demand on the part of manufacture, the fall in ocean freight rates, and the development of Hamburg's shipping connections.

The demand for American hardwoods in the Scandinavian markets has increased considerably during the past two months. Sawn oak forms the principal item in importation of American hardwoods, and as it is in this particular product that German competition has been most severely felt, the gradual rise in German prices and the growing inferiority of the quality of their products has enhanced the chances for American exporters. Late shipments from the United States, although not large, show a decided increase.

(Turn to page 1319)



Visualized Advertisements

MANY rules have been prescribed for securing results with hand-lettered copy. As a means for securing attention it has been used by all classes of advertisers. In their search for the unusual they have ranged from precise, widely spaced lettering to flowing script styles that were often the last word in smartness—and illegibility. Every effort was made to incorporate charm, character and pictorial values that would help impress the product upon the mind of the reader of the advertisement. And in many cases by choosing a type of lettering the general character of which was expressive of the product, advertisers were able to secure the elusive quality of atmosphere and achieve a certain distinctive appearance that made their advertisements stand out from others.



The lettering "tells the story" in these examples. Lettering can be made to fashion ideas and impress the quality of the articles advertised, as well as to act as a trade-mark.

But the examples shown herewith represent a still more effective method of putting across the message. In these advertisements the distinguishing characteristic of the product is expressed or pictured in each letter of the name or caption. The outline of the letters forming the word "Disston," for example, visualizes the product more compellingly than a page of copy or an elaborate illustration. It not only expresses the strength necessary in an advertisement of machinery or tools, but it typifies the product itself. Similarly, the words "Keen Kutter," by their formation and arrangement, suggest knifelike sharpness and efficient workmanship.

Not only the product itself but the office it performs, or the end achieved, through its use, may be similarly expressed. The suggestion of intense heat is adequately conveyed in the outlines of the "Sunbeam" advertisement and the idea of refrigeration is expressed by the word "Polar."

A glance at one of the letters of the words "Parker Vises" is sufficient to acquaint anyone with the product advertised; moreover, the rugged outline serves the twofold purpose of suggesting solidity and dependability.

Of just the opposite character is the caption "Eversharp Hours." The clean-cut lines of script emphasize the desirability of legible characters, make us desire to possess the instrument with which such precise lines were written.

"Signlite" and "Radio" suggest, respectively, electric signs and the wireless, while the somewhat intricate make-up of "Glolog" radiates comfort. Even in plain black and white it carries with it the suggestion of warmth. Another advantage of this form of lettering is its brevity. Since the expressive outline is as a rule used only in the name of the product or in the trade name, there can be no long, heavy lines of type to tire the eye; the unique outline of the letters stands out the more clearly because of the breathing space around it and of the contrast offered by the plain type on all sides of it. In thus adhering to the principle of brevity, the letterers of these unique forms are adhering to the sound principles embodied in the oldest forms of lettering, such as the inscriptions on the old Greek and Roman temples. In all of these as few letters were used as possible, wide spacing was employed and the whole effect was one of combined simplicity and dignity.

But simplicity of style and excellence of lettering is not always sufficient to secure attention. The letterers who planned the inscriptions on the old temples knew they were ornamenting something that would endure for generations. They were reasonably sure, if not of appreciation, at least of a reading of the words they carved. But the efforts of advertising letterers today depend for their success upon a casual reading by an uninterested audience. The average magazine reader, for example, may be intensely interested in the mystery story that he follows through many "continuations" to the back pages of the periodical, but he is not vitally concerned with reading the story of your product. Hence the value of lettering that stands out from the page and forces itself upon his attention by its unique pictorial quality.

Department Store Dependence on Newspapers

THE recent charge of Senator McCumber in regard to the influence exerted upon newspapers by department stores for a low tariff may be easily disproved by a consideration of the actual facts in the case. Although the newspapers can get along without the department store, the department store cannot get along without the newspaper. In fact, the average department store depends upon the daily newspaper advertisement for its very existence. Proof of this may be found in the drop in department store sales that invariably accompany a pressmen's strike in any city.

Printers' Ink points out that although publishers are naturally anxious to please their advertisers, they know that advertisers are not in the habit of buying space in a publication simply because its editor's opinion concides with theirs. They know that the only way to please an advertiser is to give him circulation. Advertising values must be founded on honest circulation and genuine circulation in turn can be built only on editorial merit. It must be remembered that both the department store and the newspaper are seeking the same thing—circulation, and that it is upon this circulation basis alone that advertisements are placed. There are many newspapers, of course, that are strongly in favor of a high tariff.



Too Many Motor Truck Dealers

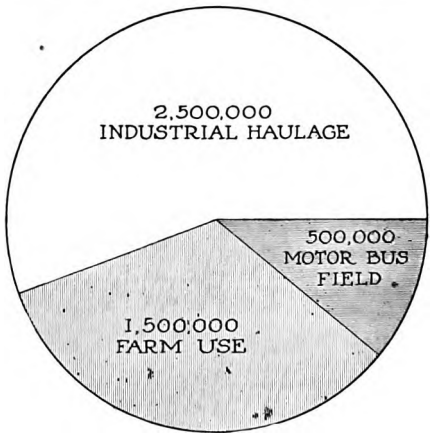
ONE of the most striking examples of multiplication and wastefulness of effort, and of destructive competition is furnished in the automotive truck industry. The distributing branch of the truck industry, weighed by the number of factors in it, is many times as large as it needs to be for distribution of the product that has been, or can be, moved by it, and it threatens to expand still further in the future unless some method of restraint is discovered. According to *Power Wagon,* "the distributing system of this industry is largely of the nature of a bubble which, unable longer to withstand the ever increasing internal pressure of unwarranted expansion, must inevitably burst, with disaster to the bubble and serious shock to the surrounding atmosphere."

The truck industry possesses a distributing system which includes nearly 24,000 dealers engaged in the business of retailing motor trucks and at no time except in the "boom" years of 1919 and 1920 have more than 150,000 trucks been disposed of in a single year. The profits on six sales per year cannot possibly be a paying proposition. In the smaller towns the dealers change their lines from year to year or oftener in the search for a "fast-selling" truck, ask ridiculously low prices in order to salvage their investment, and "by the sheer weight of their numbers mislead truck makers into believing that production must be advanced to meet the pressing demand of the 'great unsold.'" And even in the largest markets of the country, the situation is not much different, except that a demand exists that can be measured.

Another source of annoyance and of diminished profit to the dealer may be found in the readiness with which the average dealer complies with the demands the customer makes when buying a truck. Lacking technical knowledge and unable to afford the services of a competent engineer, the dealer is often persuaded into making expensive changes which add nothing to the value of the truck.

New European Taxicabs Designed for Big Economy. Description of new French car designs, intended primarily for taxicab use, shows that these have been designed and built around the idea of superlative economy. This has necessitated few, simple, lightweight parts, small motors, compactness throughout to reduce chassis weight, general paring down of weight to permit use of small tires, etc. New Citroen, Renault and Fiat are described, and compared with Ford. The former has a four-cylinder motor of 2 11/16 bore and 3 15/16 inch stroke, a wheelbase of 111 ins., and a tread of but 46 ins. The narrow tread and small two-passenger body have brought the weight down to not more than 2600 with a driver and two passengers; can be carried economically on 24x3½ tires, smaller than the average motorcycle. These cars in use in Paris average nearly 30 m. per gal. Details of the other taxicabs mentioned are given also. W. F. BRADLEY, *Automotive Industries,* 6-15-22, 1800 w. MAH.

Light Metal Research Will Affect Automotive Design. Increasing use of aluminum in the automotive field is noted, with a fairly general trend toward this metal or an alloy of it for pistons, crankcases, gear cases, most recently for connecting rods, and to come in the very near future what is practically an all-aluminum car. This has been completed and 12 more are now being built. It is said to weigh but 1,550 lbs., which is an even 1000 lbs. less than the average car of the same wheelbase, power and general characteristics. It is claimed that the wider use of this material will not only bring about lowered weight, which means reduced operating costs, but will also lower the first costs, since aluminum can be machined so much more rapidly than the metals that it would replace that much money can be saved on the production cost. The same sized plant could turn out many more aluminum cars or parts than of steel or iron, which fact, in turn, would mean reduced plant equipment and maintenance costs, this being reflected in the final car cost. *Automotive Industries,* 6-8-22, 1400 w. MAH.



The potential market for commercial cars totals 4,500,000. The estimates for motor buses are for current requirements only.—*(Commercial Car Journal.)*

Motor Bus—Today and Tomorrow. Cost studies help to define the proper field of bus transportation, and from these it is found that the return on the investment is more important factor than the operating cost. Many experiments are being carried on, particularly in the search for greater passenger comfort. The newer limousine buses have made their appearance, and have been well received. The railway interests are less antagonistic. Other subjects treated are lower hung bodies, better lighting, heating and ventilation, the bus versus the private car, etc. WALTER JACKSON, *Automotive Industries,* 6-8-22, 7500 w. MAH.

Market Research Essential to Development of Tractor Design. Author makes this point at outset: Since farming methods are not likely to be changed to meet tractor requirements, tractor must meet farm needs. In order that tractor manufacturers may do the latter, research into farming methods, results desired, results actually obtained and other things of a similar nature will be necessary. All these things will influence future tractor design and construction. Figures are given of tractor production by years, distribution of Ford tractor sales to Jan. 1, 1922, by States' distribution of farms by size and actual number of tractors in the same sections, with their distribution, and similar data. E. A. WHITE, *Automotive Industries,* 6-8-22, 3200 w. MAH.

America in Airplane Research. Practically all aircraft activity may be classed as research and investigation, because the industry and its products are still in the embryo stage. However, much useful work is being done which will advance the industry rapidly in the near future. Within this classification come increased speed and reliability, development of helicopters, variable pitch propellers, landing field development, insurance and accident studies, larger engines, better fuel utilization, aerial cameras and photography, aerodynamic research, etc. ARCHIBALD BLACK, *Automotive Industries,* 6-8-22, 9300 w. MAH.

In England there are 600 motor trucking companies carrying freight for distances of 100 miles or more.—*Tractor World.*

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Grading Portland Cement

THE ENGINEERING NEWS-RECORD believes that the time is approaching when cement will be graded. Although the present standard cement specification is undoubtedly a great improvement on the standards of some years ago, it perpetuates the fallacy that all Portland cement is alike, or at least equally acceptable, provided it is just as good in a number of particulars. But it is pointed out that cement for different uses requires different properties. And at the present time there is difficulty in specifying cement qualities that will indicate these properties.

The choice of a particular brand of cement is frequently determined by the reputation for quality it has achieved among users. Since the raw materials from which the cement is made vary in composition, it is necessary for the manufacturer to allow for this, combining and treating these raw materials in accordance with their nature in order that the product may be of proper quality. This calls for constant supervision and the making of frequent tests of the material during manufacture. In carrying out a process of this kind the element of character on the part of the manufacturer is important, his determination to maintain a standard of his own somewhat above the requirements set by the standard specifications.

But much more desirable than a reputation for excellence would be the distinct grading of cement for special purposes. This trend toward specialization is already being recognized by a few progressive manufacturers who, in their advertising, emphasize certain characteristics of their product. And as the value of these refinements in the manufacture become apparent to the consumer, insistence upon grading is almost certain to increase. Although there are some commercial reasons why one, and only one, cement standard should prevail, it is believed that they will in time bow to the demands of the user.

Solving Problems of Portland Cement Industry. Tells what Portland Cement Association is doing to improve cement, and its ultimate product, concrete. Covers work on specifications, research laboratory, improvements in manufacture; and economic bearing, public service and future developments. F. W. KELLEY, *Eng. News-Record,* 6-15-22, 3000 w. CS.

Investigation of Sulphide Cement. Results of tests by Illinois Division of Highways. Chemical analysis of cement disclosed presence 2% free sulphur, which when reduced resulted in .51% calcium sulphide. Briquettes showed decrease in strength with age. Caused by method employed in burning limestone and clay in kilns. Corrected by reducing blast nozzle from 18-in. to 10-in. and increasing pressure. H. F. CLEMMER, *Highway Engineer & Contractor,* 6-22, 500 w. CS.

Grading and Measuring Concrete Aggregates. Covers discussion of Indiana specifications for sand and gravel. R. C. YEOMAN, *Cement, Mill & Quarry,* 5-20-22, 1200 w. CS.

How to Use Concrete in Tree Dentistry. Illustrated article showing how to use concrete to repair trees. C. H. THOMAS, *Concrete,* 6-22, 500 w. CS.

Lime Plant without Precedent. Description of new plant with combination of most recent methods at Bellefonte, Pa. Use shaft at 52° angle, 390-ft. deep, through stratum parallel to that containing stone desired. Stone reached by four stopes with 30-ft. faces in three benches. Above ground plant rebuilt in latest design; illustrated. J. J. FITZGERALD, *Pit & Quarry,* 6-22, 3000 w. CS.

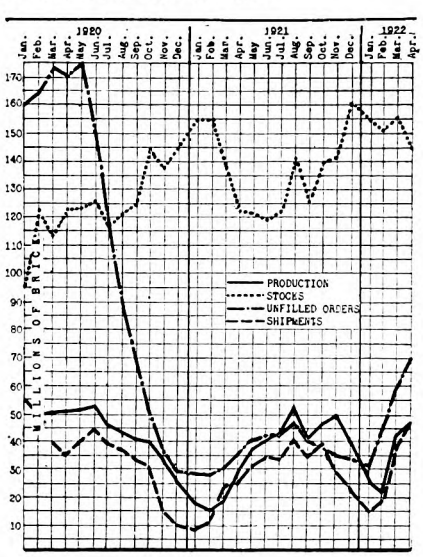
Slate as Permanent Roofing Material. Covers origin and importance, possible improvements in manufacture and classification, and laying of slate roof. OLIVER BOWLES, *Eng. World,* 6-22, 3000 w. CS.

Pure Calcium Carbonate, or "Iceland Spar." Limestone in most valuable form found in Iceland spar, occurs in California, Montana, Spain and Argentina. Covers properties and uses. OLIVER BOWLES, *Rock Products,* 6-3-22, 3000 w. CS.

Origin of Brick. Brief history of brick from time of Babylonians about 4500 B. C. to present time. *Builders Guide.* 6-7-22, 1000 w. CS.

Variation in Brick Strength. Results of tests on brick made by building material research committee of British Government. Writer believes 4-inch brick walls should be allowed in America for interior bearing and non-bearing partition, instead of present 8-inch minimum. W. CARVER, *Amer. Builder,* 6-22, 2000 w. CS.

Asbestos. Part VI. Covers some historical uses and modern mining and uses. JOSEPH K. COSTELLO, *Building Materials,* 6-22, 1800 w. CS.



Production, stocks, unfilled orders and shipments of face brick in 1920, 1921 and 1922. According to figures by the American Face Brick Association.—*(Brick & Clay Record.)*

Correct Methods Lower Burning Costs. Comprehensive article telling what happens in kiln during burning, gives outline for efficient burning records, and suggests method for studying burning process. Illustrated. J. H. KRUSON, *Brick & Clay Record,* 6-13-22, 3500 w. CS.

Development of Asphalt Industry. Author traces steady growth in use of asphalt pavement from 1902 to date. Describes material itself, as to physical and chemical properties, tells how it is taken out of the ground, transported, stored, used in actual paving, and gives its advantages over other forms of pavement. Considerable reference is made to asphalt base of Mexican petroleum oil, as a possible large future source of raw material. Data given on Mexican, Trinidad, Venezuela and other sources. PREVOST HUBBARD, *Motor Truck,* 4-22, 5600 w. MAH.

Undesirable Diversity in Non-Metallic Mineral Products. Two processes involved in movement toward simplicity —elimination and standardization. Elimination by agreement between consumers and producers based on facts deduced from statistical data. Standards established on physical and chemical properties and requirements of consumers. Covers work already done along following lines: brick, slate, switchboards, sand, gravel, stone, paving block, feldspar, mineral fillers, mica. OLIVER BOWLES, *Cement, Mill & Quarry,* 5-20-22, 1700 w. CS.

Non-Metallic Mineral-Filler Industry of the South. Part one of an extensive treatise on this subject treats of the general mineral filler industry, what materials comprise the fillers, how they are used, and present business conditions with the producers. Then he takes up the fillers in order, giving detailed information about each. Some of those covered in this article are white clays, barite and graphite. W. M. WEIGEL, *Cement, Mill and Quarry,* 3-22, 3400 w. MAH.

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Bus Fares Lowered One-Third By Fuel Alcohol

THAT alcohol may eventually take the place of gasoline as a source of power is predicted by the *Engineering and Mining Journal.* This substitution would not only result in a cheaper fuel, but since alcohol is the product of vegetable growth it would insure an inexhaustible supply through the scientific cultivation of natural products.

It has been found, however, that alcohol for this purpose can be made only at a prohibitive cost unless the new industry operates in conjunction with other industries. To make the venture a success the alcohol factory must be able to produce cheaply a salable by-product or the alcohol itself must be manufactured as the by-product of another industry.

In South America it is said that considerable success has resulted from the use of alcohol as a fuel in internal-combustion engines. In Cuba there is strong indication that gasoline will soon be replaced entirely by wood alcohol, obtained from the waste product of the sugar mills. The average cost of gasoline in Havana is about 50 cents per gallon, while alcohol costs only 35 cents per gallon. Those drivers of automobiles for hire using the substitute have found that they can reduce fares by one-third and that the price charged still permits a fair margin of profit after operating expenses are deducted.

Another interesting experiment is being carried on in India, where alcohol is being produced from the flowers of the malwa trees. The daily output is said to be 10,000 gallons. And in New Guinea plans are now under way for the construction of a plant that is to cost $1,000,000 for the production of alcohol from the nipa palm. It is proposed to produce 3,000,000 gallons of motor spirit per year, as well as 500 tons of paper as a by-product. This estimate no doubt is based on the success that has attended the cultivation of the nipa palm in the Philippines, where the sap forms the source of 90% of the alcohol produced there. It costs less than 10 cents per gallon.

Raw Materials of Chemical Industry. Popular lecture showing that successful development and establishment of chemical industry is primarily based upon supply of cheap and satisfactory raw materials. Discusses acid and alkali, lime and magnesia, aluminum and clay, fertilizers, metallurgical industries, bituminous materials, vegetable and animal fats and oils, naval stores and rubber industries, sugar starch, dairy industries, cellulose and textiles, leather, coal tar, etc. S. P. SADTLER, *Am. J. Pharmacy,* 6-22, 30 pp. CJW.

Hydrochloric Acid. Description of apparatus and method of manufacturing hydrochloric acid by direct union of hydrogen and chlorine. Gases obtained by electrolysis of solution of sodium or potassium chloride (sodium or potassium hydroxide is byproduct). Proportion of gases do not alter with alterations of current going through cells. Capacity will vary with number of cells connected on anode side of circuit, amperes per cell, efficiency of cells. Apparatus illustrated and process described. Fully protected by patents. H. K. MOORE, *Chem. Age,* 6-22, 1200 w. CJW.

Phosphoric Acid. Commercial production of phosphoric acid in electric furnace by condensation and electrical precipitation is now being successfully conducted. Methods of purification have been worked out and processes have been developed for manufacture of various high-grade phosphate products. Process should be applied to fertilizer production. T. SWANN, *J. Ind. Eng. Chem.,* 7-22, 1500 w. CJW.

Sulphur in Chile. Sulphur deposits of Chile are little known but form an important part of world's known reserve of mineral. Industry still in its infancy, climatic conditions complicating mining. Output in 1918 was 19,557 metric tons. Estimated resources 3,418,000 tons. Description of process of mining and refining. HERBERT G. OFFICER, *Eng. Min. J-Press,* 6-10-22, 3000 w. CJW.

Calcium Arsenate. For every 100 lbs. of calcium arsenate which is made, approximately 40 lbs. of white arsenic is necessary. Supply of arsenic annually consumed by this product thus far is not large, but it is appreciable percentage of total supply which is relatively stationary quantity. Use of arsenate for boll weevil will increase but at rate which cannot be anticipated. It will depend upon supply of arsenic which is available, upon price of cotton, upon yield of cotton per acre and upon price of arsenate. In addition other uses of arsenate are increasing annually, notably those which have to do with garden truck produce. Finally, calcium arsenate has been recently recommended as effective means of preventing alfalfa weevil from spreading. Barely possible that this use may eclipse its use as cotton insecticide. Other uses in various insecticides can easily outbid cotton market for available white arsenic. H. W. AMBRUSTER, *Chem. Met. Eng.,* 6-21-22, 3000 w. CJW.

Hydrogen Peroxide. Description of experiments carried out on manufacture of hydrogen peroxide by reaction of emulsion of barium peroxide and water upon carbon dioxide under pressure. Greatest difficulty encountered was introduction of peroxide into reaction chamber. Fairly satisfactorily settled by use of simple single-stroke plunger pump using ordinary brass check valves. Average recoveries of hydrogen peroxide were 80% to 85%, though individual experiments gave as high as 90%. Product proved very satisfactory at first but later developments indicated instability, though cause was never found. H. A. DOERNER, *Chem. Met. Eng.,* 6-14-22, 1500 w. CJW.

Ammonia is being manufactured from the nitrogen found in molasses in a sugar refinery in France.—*Steam Shovel and Dredge Mag.*

Urea. Urea is of value as stabilizer for explosive mixtures, constituent of varnish and ingredient of transparent celluloid used for photographic films, factor in organic syntheses and medicinal preparations. One important latent possibility is its use as fertilizer. Process of manufacture described consists in preparation of ammonium carbamate, autoclaving to cause partial conversion to urea, distilling resulting sludge to separate unconverted ammonia and carbon dioxide and condensation of distillate with additional gas to form new charge. Small scale plant described. Cost of ammonia will constitute principal cost of urea made by this process. It therefore unquestionably possesses important commercial possibilities. N. W. KRASE and V. L. GADDY, *J. Ind. Eng. Chem.,* 7-22, 6000 w. CJW.

Black Pigments. Continued article, present installment continuing discussion of carbon black. All attempts to increase yield has been at cost of quality. Product carefully bolted through fine wire screen and then agitated to remove air so as to pack more compactly. Method of supplying gas described. In using black, fact that it is hygroscopic must be kept in mind; moist black cannot be ground, as it will liver and not mix properly with vehicles. If moisture is in excess of 1.6%, black should be dried. H. L. BLACHFORD, *Can. Dyer and Color User,* 6-22, 1000 w. CJW.

Precipitating Cyanide Solutions. Careful tests of suggestion that acetylene might be used for this purpose show that, when free from hydrogen sulfide, acetylene has no precipitating power on cyanide solutions of silver. J. GROSS, *Reports of Investigations, Bureau of Mines,* No. 2346, 1 p. CJW.

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Ammonia Oxidation. Under present conditions saltpeter has a slight advantage over ammonia as source of strong nitric acid. The conversion cost and nitrogen cost (usually) of ammonia are less than corresponding costs of sodium nitrate, but this advantage is more than offset by necessity for concentrating nitric acid in ammonia process. Advantage of retort process probably increases as scale of manufacture decreases. If price of ammonia falls then slight advantage of retort process will disappear. Two possible uses for ammonia oxidation at present are: Lead chamber or "nitration" sulphuric acid plants, because of ease of control and uniformity of supply and in production of weak nitric acid, which can be utilized by a few industries. GUY B. TAYLOR, *Chem. Met. Eng.*, 6-28-22, 1600 w. CJW.

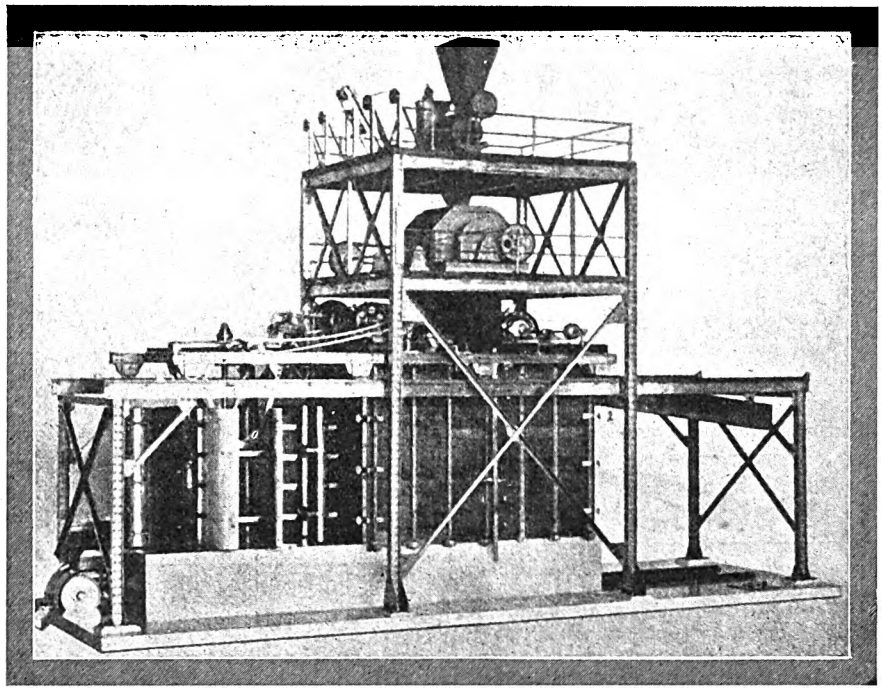
Ozone. Powerful bactericidal and deodorizing agent. Low voltage must be employed. Dielectric in ozone machine should be of some material that is not affected by moisture and can be readily cleaned. There must be accessibility for cleaning every part of equipment. Concentration must be controlled. Should be able to determine concentration accurately. H. HAMILTON, *J. Am. Soc. Heating Ventilating Eng.*, 4-22, 1500 w. CJW.

Hydrogen Sulfide in Foods. Method is described for determination of hydrogen sulfide evolved when foods are cooked at 100°C. or higher. Involves distillation of sample with steam under pressure and gravimetric determination of sulfide as barium sulfate. Green corn gives considerable quantities of substances other than hydrogen sulfide which reduce potassium permanganate and this method makes study of these products possible. E. E. KOHMAN, *J. Ind. Eng. Chem.*, 6-22, 2250 w. CJW.

Liquid Soaps. Ordinarily consists of mixture of water, glycerine and potassium soap of cocoanut oil. Clear product depends upon grade of materials used and on care of manufacture. Oil of Cochin quality furnishes good base for high-grade product, though highest quality liquid soap made from oil containing not over 5% fatty acids. M. DONIGER, *Chem. Met. Eng.*, 6-14-22, 750 w. CJW.

Indicator. Phenolphthalein not always satisfactory as test for free alkali in soap. May be due to temperature of soap or to presence of carbonates. Suggests solution in alcohol, in which carbonates are insoluble. K. L. WEBER, *American Perfumer*, 6-22, 750 w. CJW.

Glycerine Recovery. Crude lyes purified by precipitating out soap and fatty acids as insoluble salts, usually of aluminum or iron. Detailed directions given for process. Limits of reaction at close of treatment are 0.01% acid to 0.02% alkaline. Evaporation of lyes usually carried out in single or double effect vacuum effect evaporators. Single effect used in most soap works. Operation of removal of salt until half-crude stage is reached and preparation of 80% crude glycerine described. Losses are avoided by preventing sudden rises in vacuum, because this condition causes crude liquor to be carried over into catchall. Decrease in rate of evaporation of any evaporator is most frequently due to slating-up of tubes. Methods of preventing this. WALTER E. SANGER, *Chem. Met. Eng.*, 6-28-22, 4000 w. CJW.



New Mechanical Den and Excavator

Fertilizer manufacturers will see at their convention this year a working model of this Sturtevant den and excavator. This acidulating unit consists of automatic dust and acid scales. The scales discharge into a new type of leakless mixer, without plug or plows, which violently agitates the acid and rock, with no dead spots, and therefore causes quick chemical reaction within the mixer before discharge into the den. When these correctly weighed and intimately mixed batches have filled the den, the sides are loosened and the front raised, within thirty minutes after the last batch has been deposited, and the beautifully honeycombed block of acid phosphate is seen ready to instantly cut out. The mechanical excavator and aerator is now started and the den sides slowly and automatically move backward as the fan cutters advance, shaving thin slices away from the block of acid phosphate, at the same time aerating the surface and delivering the crumbly, granular acid phosphate to the pan conveyor which removes it to storage. This operation simply removes the surplus water moisture, thus hastening the formation of water crystals, and leaving no lumps, it is claimed. There is said to be no reversion in the pile, yet sufficient moisture is retained to complete the chemical reaction and cut down the insoluble to a minimum.
—(Commercial Fertilizer.)

Indigo. Continued article, present installment discussing use of indigo in dyeing, vats, the hydrosulfides, and printing with indigo. Indigo valued because of its fastness to repeated washing and wear. Any fading will be merely weakening of intensity of hue. Addition of bone glue previous to dyeing gives bright, beautiful reddish casts. WM. B. NANSON, *Cotton*, 6-22, 2000 w. CJW.

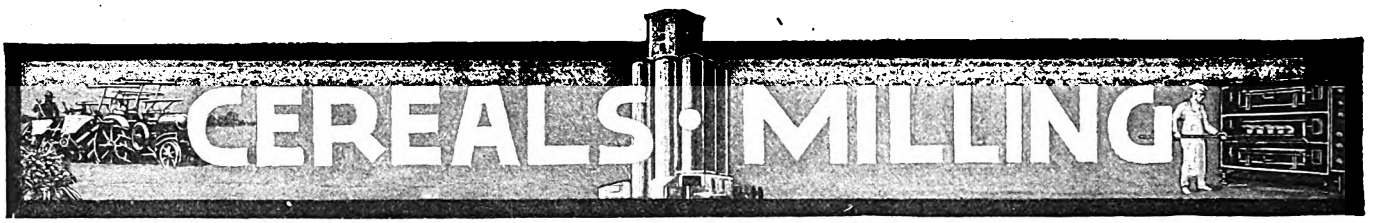
Marketing Chemicals. Various component departments co-operating in marketing function are illustrated in following steps:

1. Locate the market.
   Sales research or engineering.
2. Interest it in the product.
   Advertising.
3. Classify prospects.
   Credit.
4. Consummate sales.
   Sales.
5. Deliver the product.
   Traffic.
6. Keep customer satisfied.
   Trouble dept., or sales source.
7. Collect the bills.
   Collection (or credit).

There follows general discussion of the question of advertising in chemical industry, under three heads of planning, production and statistical. Chemical advertising limited to direct advertising and advertising in technical and trade periodicals. Problems must be solved by aid of advertising experts. Advertising agency and advertising department complimentary and not interchangeable. CHARLES WADSWORTH, *Chem. Met. Eng.*, 5-17-22, 2000 w. CJW.

Fat and Oil Industries. Fats play an important part in economic development of any country. Important to know exact composition of fats and oils, and limits of variations in chemical and physical characteristics of pure oils. Research work of Bureau of Chemistry on fats and oils discussed as well as its limitations. Believed that Governmental laboratories should investigate fundamental problems, and that results should be made public as completely as possible. Services of Bureau at service of industries in consulting capacity and work of value to the industry will be undertaken if possible. W. W. SKINNER, *Chem. Age*, 6-22, 2000 w. CJW.

Artificial camphor made from coal tar has broken Japan's long established monopoly on this article.—*Steam Shovel and Dredge Mag.*



The Miller's Share in the Profits

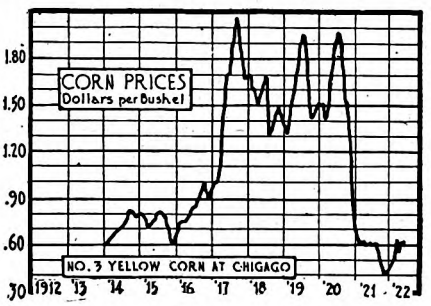
A WRITER in a recent issue of *American Miller* discussing the interesting question of what part of the consumer's dollar spent for bread goes to the miller, says that this question has been answered by data recently published by the Joint Commission of Agricultural Inquiry which shows the division of the dollar in 1921 between production and distribution agencies and between costs and profits. According to these figures the retailer of bread receives 16.6 cents, of which 15.7 cents constitute operating expense and 2.9 cents are profit. The baker gets 42.9 cents, of which 12.3 cents represent the cost of manufacture, 16.4 cents selling cost, 8.5 cents overhead, and 5.7 cents profit. The producer of the wheat receives 28.1 cents. This, it is pointed out, accounts for 89.6 cents of the dollar. Transportation to the mill costs 2.6 cents of the dollar; transportation from the mill 4.4 cents, leaving only 3.4 cents to divide between the miller and the grain man, which must cover cost and profit. Although the margin of profit for the producer of the wheat is not large, he is today receiving as much of the dollar spent by the consumer for bread in 1921 as he did in 1913.

Dust Explosions. Flour milling industry has made significant progress in controlling dust explosions and reducing losses from this particular cause. Federal investigation of dust explosions undertaken at request of millers in 1913. Summary of dust explosion losses in various industries. Each explosion has average loss of $270,000. Dust removal in grain elevators very important. Co-operation of millers necessary. DAVID J. PRICE, *Chem. Met. Eng*, 6-28-22, 3500 w. CJW.

Soft Wheat Milling. To bring soft wheat up to high standard of milling, it is necessary that wheat be not only graded as to quality and test, but also as to moisture. Even tempering important. Difficult to mill wheat that is made up of blend of wheat varying in moisture of 2% to 4% and left in bin for a time to equalize moisture. Milling soft wheat with uneven tempering interferes with color and ash. Hours of temper should depend on moisture already present in wheat. After tempering, wheat should be scoured in such a way as to remove little of bran and as much as possible of fiber, beard and stem. Methods of tempering include steam, heat and water. Water and steam preferable. JAMES J. SCHEURICH, *Dixie Miller*, 6-22, 2500 w. HHH.

New grain elevators have been installed at the port of Dunkirk by means of which it is possible to discharge vessels at the rate of about 2,000 tons per diem, all cargo discharged being sacked by the elevators. It is also stated that by this method the loss of weight through discharge has been reduced from 0.92% to 0.42%.—*Nauticus.*

Standardization of Bakers' Materials. Any system of standardization or definitions of a product should have two objects in view: First, to afford protection to buyer or consumer of product, and second, to prevent adulteration of product by producer and unfair methods of competition within industry in order to protect honest manufacturers against unscrupulous ones. Importance of knowing relative value of shortenings and of demanding purity in bread ingredients. Co-operation between shop and laboratory essential. *Baker's Helper*, 7-22, 2500 w. HHH.



Corn prices, dollars per bushel, 1912-1922.—*(Magazine of Wall Street.)*

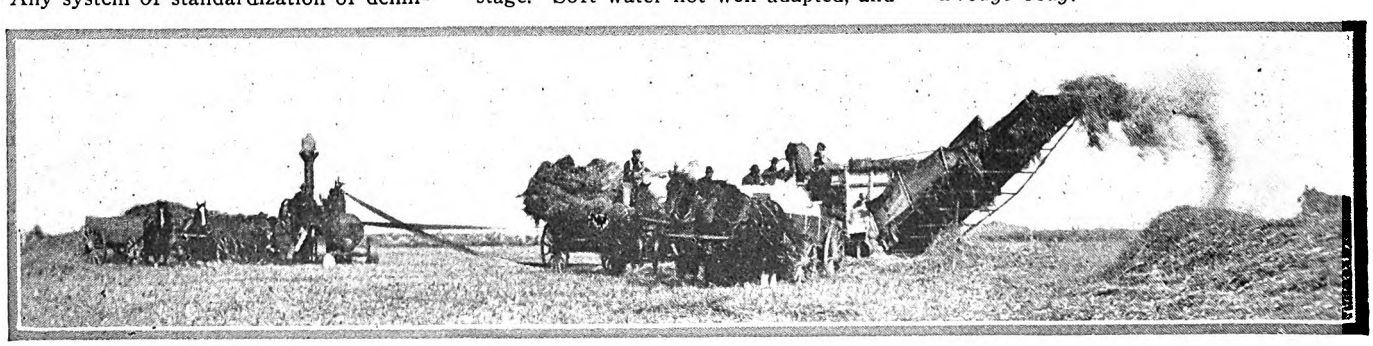
Cakes and Chemistry. A series explaining principles underlying methods of chemical analysis. Current instalment presents analyses of butter and margarine and milk and butter standards, with several tables of comparisons. WILLIAM JAGO, *Bakers' Helper*, 6-1-22, 3000 w. WRB.

Importance of Water in Baking. Recent investigation shows that mineral matter held in solution and suspension in water has far-reaching effect on doughs during fermentation and baking stage. Soft water not well adapted, and alkaline water has detrimental effect on dough. To overcome differences in water, compound of inorganic salts added to soft water will make it fit for baking purposes. European investigators find that better yeast can be cultured in hard water than in soft water. *Bakers' Weekly*, 6-25-22, 2000 w. HHH.

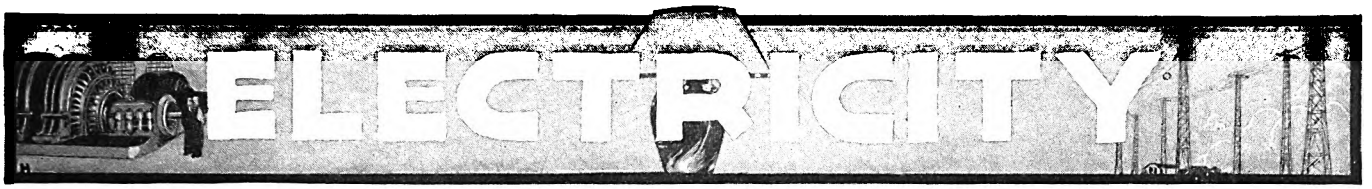
Biscuit and Cake Manufacture—II. In biscuit practically only value derived from use of milk comes from butter fat contained. May be replaced by equivalent amount of butter, and milk is therefore not recommended. In drop and pound cakes butter fat of value as food, but milk also important because of its emulsifying power. Since this is necessary in securing good finished product, milk is recommended. In sugar wafer tops emulsifying power of milk is absolutely essential for manufacture of good product. Butter fat of milk can be replaced by other oils if desired. W. PLATT, *Chem. Age*, 5-22, 3000 w. CJW.

Art of Bread Making. New standards needed for science and art of bread-making, new standards for service and new methods of attack in competition and ways and means for eliminating waste of time, material, forms, etc. Desirable to reduce all classes of pan bread to unit weight to volume system, and to establish standard for cubic measurement of pan for each ounce of dough and eliminate many of sizes and shapes now being made. R. L. CORBY, *Bakers' Weekly*, 7-1-22, 2000 w. HHH.

The manufacture has been begun in New Zealand of a flour made from the lean meat of sheep and cattle, treated by a process that removes all but less than 8% of water.—*Steam Shovel and Dredge Mag.*



(Canadian Pacific R.R.)



Electric Home-Heating Practical

THAT the heating of homes by electricity may in a few years no longer be considered a luxury, but the cleanest and most economical method of heating, is indicated by its popularity in the West. According to the *Journal of Electricity and Western Industry,* there has been more active interest shown in this field by the public than in almost any other line of electrical activity.

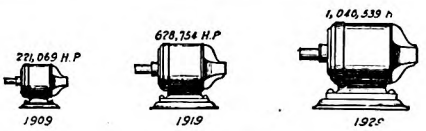
Perhaps the most interesting part of the development has been that it has not required excessively low rates on the part of the power companies. Although electric heating is still a little more expensive than other methods, a scientific use of intermediate and low heats makes this difference comparatively insignificant, when the increased cleanliness and comfort are taken into consideration.

Although power companies in the Intermountain district have protested in the past against the electric heating load, it has been found that such a load will in reality prove advantageous, especially if some means can be devised to bring it on at "valley" periods of the day. A water-heating system which will utilize current during the night, warming the house through the stored heat in the daytime, has been suggested as one means of bringing about the desired end.

Load and Generator Capacity. Demand factor is ratio of maximum demand of any system to total connected load of system. Load factor is ratio of average power to maximum power during certain period of time. Principal applications of electric power in coal mines are ventilation, electric hoists, crushers and washers, shop and tipple machinery, pumps and booster fans, mining machines and locomotives. Each of these applications is discussed and load curves shown. CARL LEE, *Coal Age,* 6-22-22, 2000 w. 13 curves. CJW.

Inductive Interference Antidotes. Causes, effects and means of elimination or reduction of inductive interference are discussed. Chief antidotes for mitigation of inductive interference are elimination of harmonics, other than the fundamental, the balancing of residual currents and voltages, the transposition of telephone and power lines and the separation of telephone and powers lines. Harmonics are due to the design of the generator and motors, to the operation of transformers at such load that the iron approaches magneto saturation and to the presence of arc lights and accidental arcing. Balanced circuits should be used. Residual currents are due to unbalanced loads, grounds in the line, unbalanced capacity and leakage, grounding of transformer bank at other than neutral points, opening of a phase, and charging and discharging of electrolytic lightning arrestors. Residual currents and voltages should be balanced. W. J. WOPAL, *Telephony,* 6-24-22. IG.

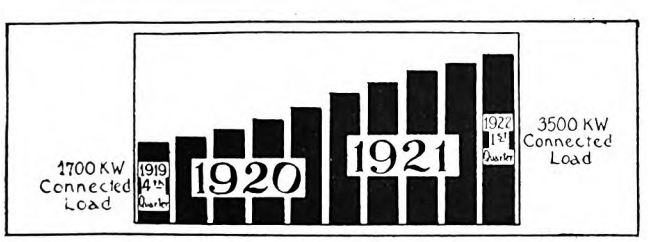
Starting Synchronous Motors Driving Ammonia Compressors. Author explains applications of synchronous motors are increasing widely, and each new one brings up some new problems. In using these motors to drive ammonia compressors, there are number of special problems, and one is starting. Author discusses this from all viewpoints, including higher starting torque required, special case of direct-connected unit, difficulties peculiar to use of large flywheels, variation in pressure drop in by-pass, and many other points of importance to operating engineer. A. R. STEVENSON, JR., *Power,* 5-16-22, 4600 w. MAH.



Estimated increase in h.p. motors in Western mines. The increase is typical. The only lagging is that of prime movers, which is due to fewer mines generating their own power—and more purchasing from power companies.—(*Journal of Electricity and Western Industry.*)

Electricity in the House. The seventh and concluding paper in this series which went into detail on proper wiring of each room in modern home. This instalment deals with halls, stairs and porch. It brings out the fact that today in a modern home the lighting is 28.5%, the power 34.5%, and the appliance load is 37% of the total bill each month for electricity. M. O. WHITTON, *Amer. Architect,* 7-5-22. 2500 w. EMcC.

Operation of Traction Type Elevator Machine Alternating Current Motor Controller. The different parts of a controller for a single speed alternating current elevator motor are explained, and the circuits are traced out through the controller and motor for one direction of the machine. W. ZEPERNICK, *Power,* 7-4-22. IG.



The electrical advertising load shows constant growth.—(*Signs of the Times.*)

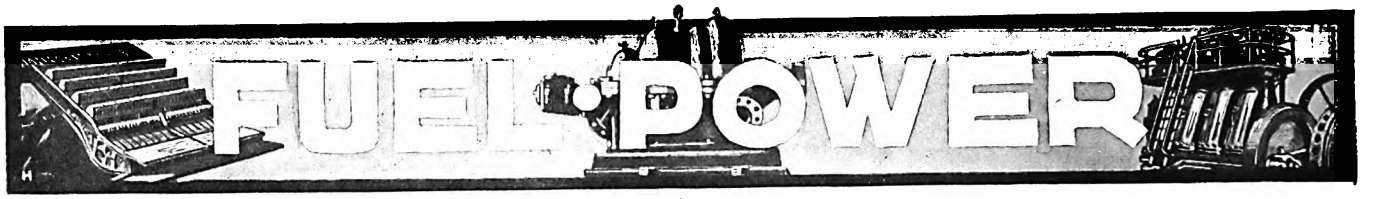
Tests for Electrical Transformer Oils. Function of transformer oil is to dissipate heat generated in transformer and at same time provide adequate electrical insulation between surfaces of wide potential difference. Initial requirements for a good transformer oil are three: High electrical insulating quality as indicated by dielectric strength and resistivity; ability to dissipate heat as indicated by viscosity, specific heat, heat conductivity, cold test, etc.; suitability from the standpoints of evaporation loss and of safety from fire hazard as indicated by the flash point. Durability or ability of the transformer oil to retain its essential original properties, even after prolonged use, is also just as important. Transformer oils may deteriorate in service as far as electrical insulating efficiency is concerned through chemical formation of water, of organic acids, or soaps derived from such acids on the metallic components of the transformer. Oils should be provided which will pass durability test to cover decrease in insulating value due to oxidation. Deterioration as regards heat dissipation is somewhat more complicated. Oil must absorb heat generated in transformer core and windings, circulate to a cool surface and there transfer the heat. Viscosity of the oil should not change due to evaporation or chemical processes, otherwise, circulation is impaired. Chemical changes taking place in the oil seem to be due mainly to oxidation, which is accelerated by the catalytic action of the metals, resins, metallic compounds or even atmospheric dust which comes in contact with it. Various oxidation tests are described. Deposit or formalite test, iodine addition values and iodine substitution values and sulphuric acid absorption tests should also be made. E. T. DELBRIDGE, *Oil News,* 7-5-22. IG.

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Runaway Prices for Coal Coming

IF production in the coal fields is not resumed by August 1, it is believed that panic among both industrial and domestic users of coal will force prices up to a point that will increase manufacturing expenses. *Coal Age* points out that production, measured against demand, not consumption, sets the price. And from now on demand will be equal to consumption plus what the buyer would like to store against next winter's needs. As the impossibility of meeting this demand becomes evident, the industrial users of coal will bid against each other to secure coal to carry over the winter.

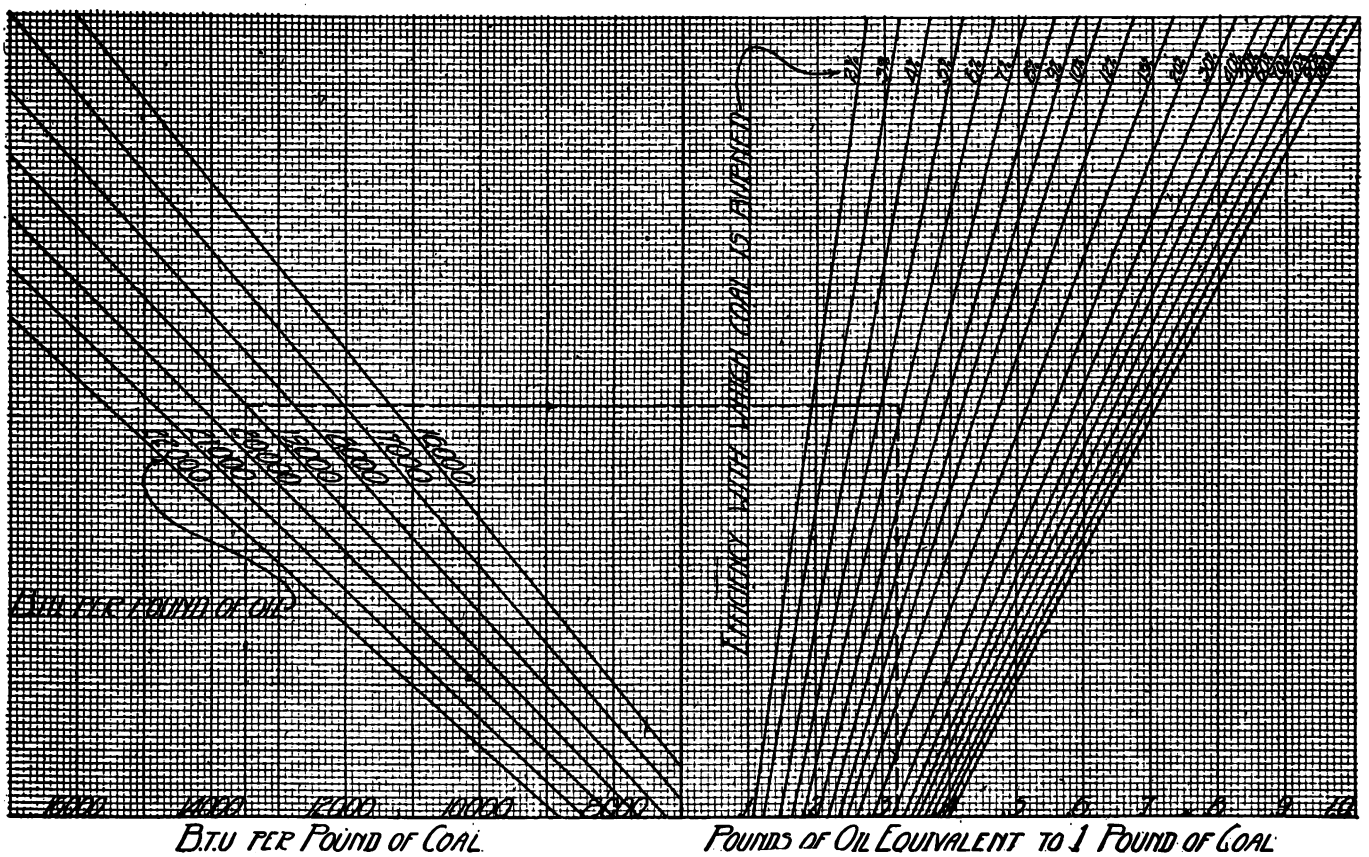
A consideration of the rapidly diminishing stock of coal now on hand will prove that the danger of a coal famine has not been exaggerated. There are said to be practically no available above-ground supplies of anthracite except those held by retail dealers and that already in residence cellars. Pea is the only size that can be had from producers in quantity. The hard-coal mines have no over capacity with which to make up deficiencies and there is no non-union production to supplement that now on strike. It is asserted that even if the anthracite mines were at work now, producers would be obliged to allocate shipments. Moreover, every day's output lost from now on will sharpen the demand to a point where runaway prices for some of the independent coal will be paid.

In addition to this potential shortage of anthracite, the country faces a situation with respect to bituminous coal that under similar circumstances in the past has resulted in panic prices and exhibited all the symptoms of a shortage. In spite of the fact that extensive preparations were made for the strike, the coal in storage has decreased until by August 1 it is expected that the reserve stock of coal will amount to only 23,000,000 tons.

"Judging from the history of the past seven years," says *Coal Age*, "an above-ground stock of bituminous coal of only 10,000,000 tons represents an impossible situation in this country. During 1917 and 1918, when consumption was at the rate of about 40,000,000 tons per month, there was a serious coal shortage, when stocks were as low as 20,000,000 tons—that is, when the average for the country was equal to two weeks' requirements. Consumption is now estimated to be at the rate of 34,500,000 tons per month and two weeks' supply is therefore some 17,000,000 tons. Although skating close to the danger mark, the country had not by July 1 reached a crisis. Some time before August 1 that point will have been reached if production is not resumed. In other words, by that time, but for successful intervention by Washington, the united mine workers will have the country where it wants it."

Coal and Oil. Series of charts showing operating efficiency with coal in melting of metals, treating steel at various temperatures, burning of brick, lime, etc., and melting of glass and boiler efficiency. Accompanying chart shows amount of oil required to produce same results as one pound of coal in same or similar furnace. Examples are given to illustrate their use. C. H. Butz, *Heat-Treating Forging*, 6-22, 2500 w. CJW.

The U. S. Bureau of Mines has succeeded in producing fuel from ordinary straw.—*Tractor World.*



The amount of oil required to produce the same results as one pound of coal in the same or a similar furnace. See "Coal and Oil" digest.

Benzene and Motor Fuel. Benzene is excellent fuel for internal combustion motor. Calorific value of benzene is approximately 13% higher than that of gasoline. Tests show increase of 22.7% in miles per gal. Marked reduction of any tendency to "knock" under heavy loads, and ignition may be advanced to greater extent with view of eliminating this knock and its effects on engine. Benzene permits of leaner mixture. J. J. LAWTON, *J. Ind. Eng. Chem.*, 7-22, 600 w. CJW.

Blends of Hydrocarbons. Study of the effect of benzene and other aromatic hydrocarbons upon tendency of paraffin-base gasolines to knock or detonate. Use made of apparatus for measuring detonation by bouncing pin method. Most of determinations made on mixtures of kerosene on account of its greater tendency to detonate. Standard was paraffin fuels containing small amount of xylidine which exerts powerful suppressing effect on detonation. Simple basis for determining amount of benzene necessary to add to paraffin fuel in order to obtain given effect is: Up to concentration of 70% by molecules, effectiveness of benzene for suppressing detonation varies as square of its molecular concentration. THOMAS MIDGLEY and T. A. BOYD, *J. Ind. Eng. Chem.*, 7-22, 3500 w. CJW.

Oil-fired Boilers. Description of oil equipment at Amoskeag Mfg. Co., Manchester, N. H. Sixty-four vertical fire-tube 1500 sq. ft. boilers of Manning type are fired by mechanical burners of special design. Requires force of 13 men. Oil piped to give same pressure at all boilers. Peabody-Fisher wide-range oil burner used. Plant easily changed to coal if desired. Details. POWER, 6-13-22, 1200 w. CJW.

Evaporation. Investigation of mechanism of evaporation of liquid into gas as applied to such processes as are found in gas scrubbers, humidifiers, dehumidifiers, water coolers, air driers, etc. Formula is established for calculating humidity of air from wet- and dry-bulb thermometer readings. Coefficient of heat transfer divided by coefficient of diffusion equals humid heat of gas W. K. LEWIS, *Mechanical Eng.*, 7-22 1200 w. CJW.

Cleaning Gas Piping. Much trouble and expensive repairs are often caused by collection of foreign matter in consumers' gas lines causing flow of gas to be retarded with result that distribution is irregular. Damp cellars are prolific cause of rust stoppages as well as piping exposed on walls. Compressed air has proved to be effective agent in remedying this difficulty and after continued use has come to be recognized method for removal of these stoppages. Method of operation. J. T. GRIFFIN, *Compressed Air Mag.*, 7-22, 2000 w. CJW.

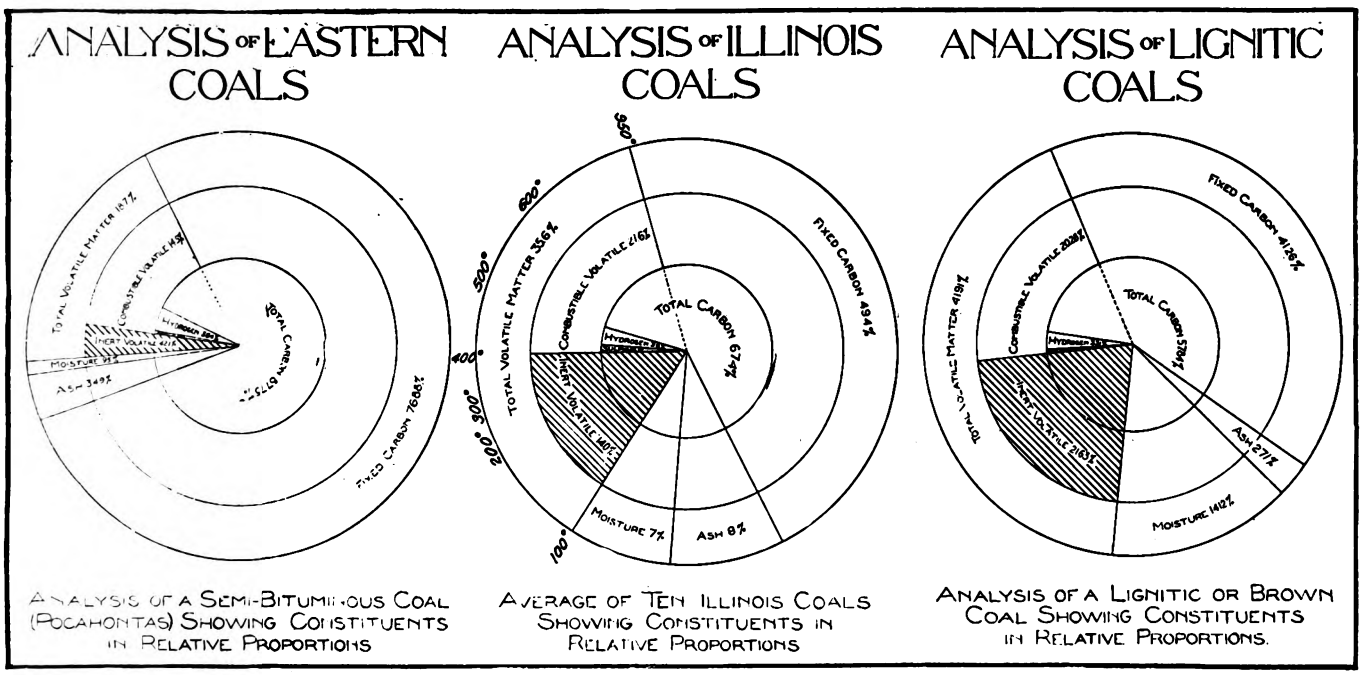
Boiler Tests. Errors entering into boiler tests are determination of water and coal used. Error in obtaining BTU in coal burned may easily reach 2.5% (weighing, 0.5; estimating fuel in furnace at start and stop, 0.5; variation in moisture, 1; failure of heat-value sample to represent bulk, 0.5) and water evaporated may be at least one per cent out of way, hence efficiency reported may be 3.5% too high or low. It is absurd to assign values carried out to 0.01% to items which cannot possibly be measured so closely. ALFRED COTTON, *Mechanical Eng.*, 7-22, 2500 w. CJW.

Combustion Research. Many of the important engine problems of today are mentioned, and the work which is being done upon them. These include detonation, its causes and effects, possible remedies for it, the effect of diluents upon it, the efficacy of dopes, flame propagation, turbulence, pressure rise during combustion, effect of small changes in initial temperatures, etc. HERBERT CHASE, *Automotive Industries*, 6-8-22, 5500 w. MAH.

Present-Day Boiler-Room Operation. Practical article on features of modern boiler room work, including efficiency of equipment, of load curve, of extensions, daily load peak, method of operation, rapid changes in load, emergency conditions, thunderstorms, loss of load, etc. I. E. MOULTHROP *and* R. E. DILLON, *Power House*, 5-5-22, 3100 w. MAH.

Significance of Chimney Draft. Notes on need of chimneys, pulling power of stacks in relation to their height and area, effect of wind pressure and methods of staying by guy ropes. Besides explaining all these points, tables are presented, and charts in which results may be read off without figuring. *Power House*, 5-5-22, 2200 w. MAH.

Making and Care of Flexible Steel Ropes. Author defines and describes wire ropes or cables, including considerable history of the early days of steel cable manufacture. He describes spooling, stranding and squeezing, and twisting, also proper materials, strength, tests, lubrication, inspection, abrasion, etc. W. VOIGHTLANDER, *Iron Age*, 4-29-22, 2400 w. MAH.



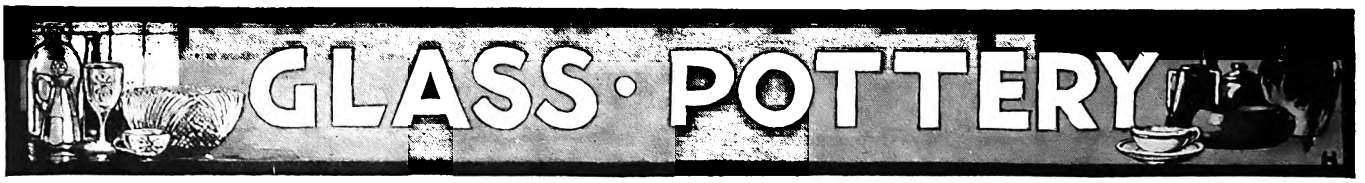
Analysis of three coals, made by Prof. S. W. Parr, of the University of Illinois.

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All Kinds of Glassware in Demand

OWING to the greatly increased demand from soft-drink manufacturers for bottles and containers, it is believed that producers of this type of glassware will be very active during the summer. Whereas the sale of beer over the bar resulted in comparatively small sales of the beverage in bottles, soft drinks must be sold bottled, and this has actually increased the glass consumption, according to some estimates.

According to *Glass Worker*, the market for glass products is being aided greatly by the fact that stocks have been low in the hands of distributors and retailers. Although these stocks are now being replenished, it appears from the nature of the orders received that most of the glass and glass products going from factories is finding an unusually short journey to the ultimate user.

The unexpected demand for plate-glass by the automotive industry and by the increasing building operations continues to keep plate-glass manufacturers at capacity. There is every indication that demand will continue active for the remainder of the year. Window glass is reported to be moving from factories in steady volume. Orders have kept up very well, and July probably will be a very active month. Stocks at factories are yet ample to take care of demand. They have been reduced, but all specifications still can be filled without much trouble. How long this favorable situation for the buyer will continue is likely to depend entirely upon the course of demand in the next few weeks. It is pointed out that there are many hundreds of buildings under roof which will need glass even if the rail strike checks transportation.

Cords in Glass. The refractivity, viscosity and expansion coefficient of cords generally differ from those of mass of glass. Methods are described for rapidly ascertaining relative values of these properties. This information, together with knowledge of batch ingredients and possible impurities, may afford in certain cases means of determining cause of the cords. F. TWYMAN, *J. Am. Ceramic Soc.*, 6-22, 1500 w. CJW.

Stained Glass. Third paper dealing with historical periods. Glass-making for churches in 14th and 15th centuries, with some illustrations; also discusses work of 16th century, at which time the art commenced to change from that of making transparent glass to the painting of pictures. JOSEPH G. REYNOLDS, JR., *Amer. Architect*, 6-21-22, 3000 w. EMcC.

Venetian Glass Industry. Revival is noted in Venetian glass industry since war, and in glass beads and trinkets, but as art and as great and beautiful industry present wares do not come up to achievements of past. Various novelties mentioned. *Crockery and Glass J.*, 6-29-22, 500 w. CJW.

Value of Colored Glassware. Writer discusses the value of colored glassware in the home. Heretofore flowers were depended upon as attention arresters, but colored glassware objects are now sharing popularity. Proper colors to use are suggested, suggestions being based on color scheme of room. *National Glass Budget*, 6-10-22, 700 w. WRB.

Glass History of England. History traced from 1549. Suggests that productive capacity might be 50% greater than at present. Only fringe of development of glass furnaces has been touched. Very marked advances in machinery in last decade. W. E. S. TURNER, *National Glass Budget*, 6-17-22, 1500 w. CJW.

Glass Making. Largely historical with special reference to manufacture of bottles. Glass-blowing machine one of most important inventions. Very brief description of process. A. W. BITTING, *Pacific Drug Rev.*, 7-22, 1400 w. CJW.

Charging Tank and Pot Furnaces. Weight and volume of batch charged into tank furnace has decided effect on efficiency of melting both from fuel as well as quality of glass point of view. Best results by continuous feeding at short intervals. Use of dog-house avoids difficulty of charging. *National Glass Budget*, 6-17-22, 750 w. CJW.

Glass House Losses. First loss is shrinkage of raw materials (10% to 15%) due to volatilization of part of chemicals used, which is unavoidable. Amount of loss by breaking pots varies according to location of break. Most of that in bottoms of pots could be saved. Loss occurs in mixing room and store room for raw materials. Five to ten pounds loss in sweepings for each pot filled. In electric light bulb plants glass used in gathering with thread could be saved (10-15 lbs. per pot in 24 hrs.). In plants manufacturing different kinds of glass, loss is due to mixing cullets of different kinds and by mixing different kinds of batch and cullet. Much waste from broken glass, which could be obviated in part by use of screens to catch waste and broken glass. Many other wastes, as of power, light, etc., might be noted. HENRY W. HESS, *Glass Worker*, 6-17-22, 1000 w. CJW.

National China. Description of process used by National China Co., of Salineville, O. Material first mixed in proper proportions, ground and mixed with water to form "slip." Then passes through fine mesh of silk to presses by means of pressure pump. Water removed under high pressure, clay run through pug mill and then formed into articles either by hand or in presses. Green ware allowed to dry thoroughly, inspected and burned. Glaze is applied in dipping room, ware again dried and then fired in glost kiln with natural gas. Decorations made to order—either hand painted, stamped or by means of decalcomania paper. *China, Glass and Lamps*, 6-12-22, 1000 w. CJW.

Tableware. Comparative tests of American and foreign tableware. American ware superior when tested in resistance to either crazing or sudden temperature changes. American hotel wares withstood much greater impact than imported wares, and domestic earthenware and china for household use was superior to foreign chinas tested, which were brittle. Resistance to chipping at edge appeared to depend more on design of edge and angle of inclination of rim than on inherent properties of bodies. All glazes were found to be unaffected by boiling in alkaline solution for 24 hrs. H. H. SORTWELL, *J. Am. Ceramic Soc.*, 6-22, 4500 w. CJW.

Firecracking in Terra Cotta. Firecracking is characterized by appearance of sharp, hair-line cracks extending into body. All bodies showed tendency to firecrack when cooled rapidly and all were free from cracks when cooled slowly. Rate of cooling more important than composition or physical properties of body. Sandy clays showed more tendency to firecrack than non-sandy vitrifying clays. Greatest tendency to firecrack was found on body with all grog finer than 40 mesh, but body with all grog coarser than 40-mesh did not appear to have much less tendency to firecrack than average. Increase of grog reduced tendency to firecrack. Kind or source not as important as size and amount, but this is less important than kind of clay. E. C. HILL, *J. Am. Ceram. Soc.*, 6-22, 4000 w. CJW.

Porcelain not fired in a kiln, but perfected by a secret process of cold hardening, is reported from Germany.—*Steam Shovel and Dredge Mag.*

An unknown malady is attacking the stained-glass panes of cathedral windows in Europe. The sickness makes the glass flake off in small pieces until the panes are so thin they crumble at the touch.—*Steam Shovel and Dredge Mag.*

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LEATHER

Shoe Production Per Employee Increasing

THE willingness of employees in the shoe industry to accept wage reductions has had a favorable effect not only on employment but on the operation of plants in the large shoe centers. United States Government figures for June indicate an increase of 17% in the employment of workers in the shoe shops of the country, but wage increase has been only 10%.

The International Shoe Company is reported to be employing 21,000 persons, and the Endicott-Johnson Company from 14,000 to 15,000 workers. Each is making from 120,000 to 125,000 pairs of shoes daily. The International company requires a larger number of employees because it makes many women's shoes, which, because of the number of different styles, call for a greater amount of labor.

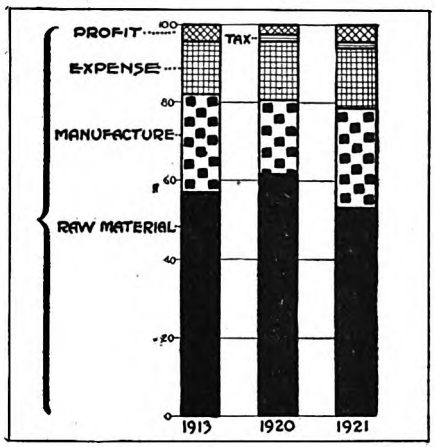
American Shoemaking points out, however, that it is doubtful whether large increases in employment will occur, for the reason that the present objective among manufacturers is to reduce production costs as much as possible. New machines are being set up and new systems devised for the purpose of simplifying the making of shoes and reducing production expense.

Another circumstance affecting employment in the shoe industry is the fact that production per average employee is increasing. According to figures recently compiled by several large concerns, each man helps to make more shoes a day, so that fewer men are required to make our total production of 1,000,000 pairs a day. For this and other reasons there is a surplus of labor, and it is still true that the demand for workers in shoe shops is not as large as is the supply.

Outersole Sorting. Much depends for the quality of the ultimate shoe upon the care and intelligence of the outersole sorter. Practice of sorting by weight only should be replaced by sorting by the hardness and firmness. Such practice relieves turn laster of much labor and adds to uniformity of quality. *Amer. Shoemaking,* 6-22, 900 w. WRB.

Syntans. Artificial tanning materials manufactured from phenol, sulphuric acid, 40% formalin and water. Phenol may vary. Manufacture consists of sulphonation of phenol derivative by sulphuric acid, condensation of this product in presence of formalin and partial neutralization by caustic soda. The products are soluble in water and contain both free sulphonic and hydroxy groups. Actual constitution not known. Precipitate gelatin, mix well with tanning extracts and allow of quick tanning with production of good leather. Should have good future. G. DESMURS, *Canadian Dyer and Color User,* 6-22, 750 w. CJW.

Chrome Tanning. Measurement of fixation of chrome by hide substance after 8.5 months' contact with chrome liquor of various concentrations showed that maximum fixation occurred in chrome liquor of concentration of 1.5 grams chromium oxide per 100 cc. of solution. The chrome collagen compound formed in this liquor proved to be an octachrome collagen, showing that combining weight of collage in as low as 94. Changes taking place when tetrachrome collagen is in contact with chrome liquors over similar period of time have been measured, showing that the formation of tetrachrom collagen is not strictly reversible. The findings support the view that "adsorption" of chromium from chrome liquors by collagen is chemical reaction. A. W. THOMAS and M. W. KELLY, *J. Ind. Eng. Chem., 7-22,* 1800 w. CJW.



The manufacturer's distribution of the dollar the retailer pays for shoes. (By the Joint Commission of Agricultural Inquiry.)

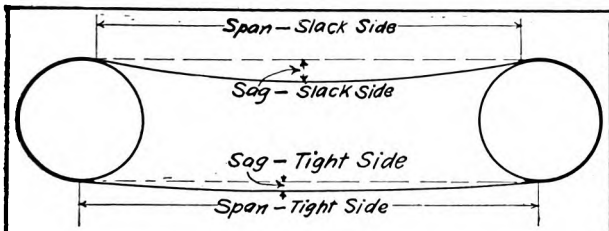
Dyeing Skins. Conclusion of two-part article, giving methods and recipes for dyeing black on rabbit skins, dyeing skin rugs and mats in process of renovation, redyeing furs, the use of logwood blacks, cleaning by chlorinating, dyeing imitation sable skins, how to discover presence of sulphur in wool, and process of dyeing naturally white skins, or skins with white points and various shades of browns, leaving the points white. *Can. Dyer and Color User,* 5-22, 2500 w. WRB.

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To determine horsepower transmitted by a leather belt, measure span of slack side as on sketch. Then measure sag, which is the greatest vertical distance between belt and straight line connecting contact points. Next measure span and sag of tight side, observing points of "making and breaking contact." In table, find tension corresponding to span and sag of slack side, which call "A." Then tension corresponding to span and sag of tight side, which call "B." Subtract "A" from "B"; multiply by width of belt in inches; multiply by thickness in inches; multiply by outside diameter of one pulley in inches; multiply by r. p. m. made by pulley; multiply by 0.000007933.

	TENSION--POUNDS PER SQUARE INCH											
	Sag -- Inches											
Span Feet	1	2	3	4	5	6	7	8	9	10	11	12
1	0.630	0.320	0.210	0.160	0.130	0.105	0.090	0.079	0.070	0.063	0.0572	0.0525
2	2.520	1.260	0.840	0.630	0.500	0.420	0.360	0.315	0.280	0.252	0.2290	0.2100
3	5.670	2.840	1.890	1.410	1.130	0.950	0.810	0.710	0.640	0.567	0.5150	0.4720
4	10.10	5.050	3.400	2.520	2.020	1.680	1.440	1.260	1.120	1.010	0.9170	0.8400
5	15.70	7.850	5.300	3.980	3.140	2.620	2.240	1.960	1.750	1.570	1.4300	1.3100
6	22.60	11.30	7.500	5.650	4.520	3.770	3.220	2.820	2.510	2.260	2.0500	1.8800
7	31.00	15.50	10.30	7.750	6.200	5.170	4.430	3.880	3.440	3.100	2.8200	2.5800
8	40.30	20.20	13.40	10.10	8.070	6.730	5.760	5.050	4.480	4.030	3.6700	3.3600
9	51.00	25.50	17.00	12.70	10.20	8.500	7.280	5.380	5.670	5.100	4.6300	4.2500
10	63.00	31.50	21.00	15.70	12.60	10.50	9.000	7.880	7.000	6.300	5.7200	5.2500
12	90.70	45.40	30.00	22.60	18.10	15.10	12.90	11.30	10.10	9.070	8.2400	7.5600
14	123.0	61.50	41.00	30.80	24.60	20.50	17.60	15.40	13.70	12.30	11.200	10.200
16	161.0	80.50	54.00	40.00	32.20	26.80	23.00	20.20	17.90	16.10	14.600	13.400
18	204.0	103.0	68.00	51.00	40.80	34.00	29.10	25.50	22.70	20.40	18.500	17.000
20	253.0	126.0	84.00	63.00	50.40	42.00	36.00	31.50	28.00	25.20	22.900	21.000
25	394.0	197.0	131.0	98.50	78.80	65.70	56.30	49.30	43.80	39.40	35.800	32.800
30	567.0	284.0	189.0	142.0	113.0	94.50	81.00	70.80	63.00	56.70	51.500	47.200
35	772.0	386.0	257.0	193.0	154.0	129.0	110.0	96.50	85.70	77.20	70.200	64.300
40	1008.	504.0	336.0	252.0	202.0	168.0	144.0	126.0	113.0	101.0	91.600	84.000
45	1275.	638.0	425.0	319.0	255.0	213.0	182.0	159.0	142.0	128.0	115.00	106.00
50	1575.	788.0	525.0	394.0	315.0	262.0	225.0	197.0	175.0	158.0	143.00	131.00
55	1905.	953.0	635.0	476.0	381.0	318.0	272.0	238.0	212.0	191.0	173.00	159.00
60	2265.	1133.	756.0	566.0	453.0	378.0	324.0	283.0	252.0	227.0	206.00	189.00

Data for measuring horsepower transmitted by leather belts. *(W. F. Schaphorst in the National Engineer)*



Large Steel Stocks at Mills

IT would serve no good purpose to foster the illusion that the coal strike curtailed the production of steel, says *Steel and Metal Digest*. On the other hand, it is pointed out that it increased production. In February and March a considerable part of the heavy buying of steel occurred because buyers were afraid that the coal strike would interfere with steel production. The strikes at Connellsville, Pa., were particularly unexpected by the operators, and presumably by the buyers of steel, and part of the heavy buying of steel in April was due to this influence. It is estimated that fully 6,000,000 tons of ingots were produced in April and May against about 4,900,000 tons in February and March. The superficial view is that production of steel was restricted in April and May by the coal strike. But in reality the speeding up of production appears to have been for the manufacture of stock reserves.

It is true, of course, that there is heavy consumption of steel in certain lines, which were inactive last year, such as freight cars, automobiles, fabricated steel and rails. Freight car buying has been at about 15,000 cars a month since the first of the year, accounting for consumption of finished rolled steel at the rate of about 200,000 tons a month. Passenger automobiles have been produced at about 200,000 a month and trucks at a trifle over 20,000 a month. Including accessories, the automobile industry will account for about 150,000 net tons a month. Rails of all classes are being rolled at the rate of about 200,000 net tons a month. The four items total 700,000 net tons of finished rolled steel a month, leaving 2,000,000 tons to be accounted for otherwise.

Corrosion of Iron and Steel. Result of corrosion test of value only under carefully controlled conditions. Initial rate of corrosion is most important, since solution rates changes as equilibrium approaches. As rule, shorter time interval between solution changes nearer will test approach actual service conditions where corroding medium is changing continuously. If test carried out over long period of time, it will be found that weight losses are practically equal for all samples tested and that metal which in reality exhausted its solution first is erroneously deemed to have equal corrosion-resistance as metals actually far superior. Tank described for experiments on this subject. D. M. STRICKLAND, *Chem. Met. Eng.*, 6-21-22, 3000 w. CJW.

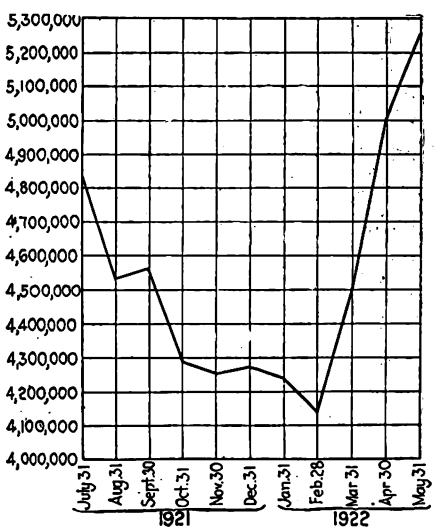
Manufacture of Iron and Steel Tubing. Author lists various processes by which iron and steel pipe and tubing are made, dividing them into the process in which a longitudinal seam is used and those without a longitudinal seam (seamless). There are ten such processes, two of them with modifications, so that the total rises to 14. The author describes each briefly and emphasizes those which are in common use in Germany, telling why such is the case. EWALD ROEBER, *Mechanical Engineering*, 5-22, 2600 w. MAH.

Iron Ore Concentration in Magnetic Log Washers. For concentrating crushed magnetite ores. Low-grade ore, on crushing to 150 mesh, is run through washers with magnetic poles in bottom which cause values to agglomerate and act as large particles easily separated from finer non-values; 25% ore concentrated to 65% iron and tailings contain only 1% magnetic iron. Extraction is better than 95%. Commercial machines now being installed. H. H. WADE, *Eng. & Min. Jour-Press*, 5-6-22, 3000 w. 7 Figs. APS.

Pure Iron Welding Wire. Has been proved that commercially pure iron wire of correct physical properties possesses every essential that could be advanced for suitable metal for welding mild steel plates, shapes, etc., by either oxy-acetylene or electric arc process. Chemical uniformity of plate and wire should receive most careful consideration. Wire should not contain or tend to create gases, should be free from slag or slag-forming ingredients, should be chemically and physically uniform, and should embody ease of operation. C. A. MCCUNE, *J. Am. Welding Soc.*, 6-22, 3000 w., 19 cuts. CJW.

Chrome-Molybdenum Steels. Really a short summary of the paper by C. N. Dawe read before the S. A. E. in June, 1921. It points out that, despite the many advantages then claimed for the metal in highly stressed parts when properly case-hardened by the special methods of the Studebaker Corp., that concern has now abandoned it for parts of that kind, substituting chrome-nickel as more easily (or at least more so commercially) hardened. *Automotive Industries*, 6-8-22, 650 w. MAH.

Heat Treatment of Chrome Steel for Ball Bearings. Discussion with numerous photomicrographs. HAAKON STYRI, *Amer. Soc. for Steel Treating*, 5-22, 3500 w. APS.



Tonnage of unfilled orders of the U. S. Steel Corporation.—*(Iron Age.)*

Chromium Magnet Steels. During the war, the need for tungsten in tool steels forced the elimination of this material in everything else, including magnet steels. This brought about the use of other alloys, and this article discusses the Reichsanstalt tests of chromium steel rods furnished by Krupp. These carried, respectively, 3%, 6% and 9% of chromium. The tests showed that steel with 1% and 9% were unsatisfactory, but those with 2% to 6% of chromium indicated decreasing permanence with increasing hardening temperature and increasing coercive force. Oil quenching gave better results than water quenching. In cyclic heating tests for permanence the higher percentages of chromium showed up best, and similarly in shock tests. It would seem from these tests that an alloy with chromium at or around 6% would give great satisfaction as a magnet steel. *Automotive Industries*, 6-8-22, 1500 w. MAH.

Decreasing Weight of Magnets. A new type of magnet steel, a cobalt-chromium steel gives a total available energy of about 30,000 ergs per ccm., which is three times that of ordinary permanent magnets (tungsten-chromium steel). Methods of hardening and testing of properties. Calculations for design. *Raw Material*, 5-22, 2200 w. APS.

Steel for Forge Welding. Principal factors—method of manufacture, chemical composition, fluxing quality, susceptibility to heat and welding temperature—affecting welding quality of steel are discussed and average results of 80 tests made on forge welds of hammer-welded pipe are compared with original material. It is stated that tests have demonstrated that both steel not over 0.15% carbon and minimum tensile strength of 47,000 lbs. per sq. in., and that not over 0.20% carbon and minimum tensile strength of 52,000 lbs. per sq. in. are satisfactory for forge welding of pipe lines, pen stocks, tank-car work and similar construction. Most important consideration to produce uniformly good results in forge welding of steel are suitable material, well-trained operators and adequate facilities for control of operations. F. N. SPELLER, *Mechanical Eng.*, 7-22, 1200 w. CJW.

Thermo-Electric Phenomena for Identifying Certain Steels. It is not possible to identify alloy steels with sufficient accuracy by means of the Brinell test, so Le Chatelier has worked out a method of testing steels by which the electromotive force produced by inserting the steel into an electric circuit may be measured. He has found with his apparatus that the same material always gives the same result when of the same composition, but will show a variation with very minute changes in composition. Hardening, on the other hand, has no effect on the reading. When this research is carried far enough, all steels may be classified and their readings listed. It will then be a simple matter to identify or prove the composition of any steel alloy by means of this device. *Automotive Industries,* 6-8-22, 800 w. MAH.

Uranium as a Steel Alloying Element. As uranium belongs in the group with molybdenum, vanadium and tungsten, all important metals in alloying steel, its use for the same purpose is being studied. It increases the hardness and hardening power of any metal to which it is added, having the peculiar property of doing this and other things alone, as contrasted with other alloying materials of which frequently two or more must be used, one to produce one desired quality, another for another, etc. Uranium increases the ductility to a remarkable extent, so that uranium steels are preeminently adapted for uses demanding a low drawing temperature. A relatively small quantity of it will replace a fairly large quantity of tungsten and give equivalent results in certain special alloy steels. In the more complex alloy steels it intensifies the desirable properties without introducing any undesirable ones. Its chief drawback is cost, due primarily to the complex nature of the ores and their highly refractory nature; in fact, most of it is produced not for itself alone, but as a by-product in the production of radium or vanadium. *Automotive Industries,* 6-8-22, 1400 w. MAH.

Increase in Tensile Strength Due to Cold Drawing. It has been known for a long time that cold drawing increases the tensile strength of steel. Janitzky, metallurgist of the Illinois Steel Co., has attempted to classify all the records and data on the subject in an attempt to formulate a law. At the same time he has been able by plotting known data to produce a double parabolic curve and to derive a general equation for this. His deductions are interesting, but not conclusive because his data were incomplete. *Automotive Industries,* 6-8-22, 800 w. MAH.

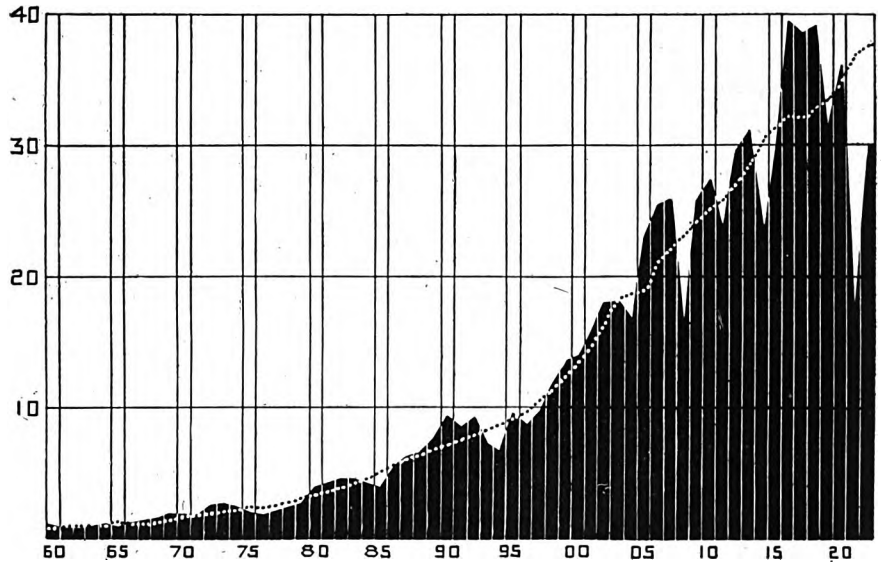
Modern Methods of Making Leaf Springs. Machine formed springs are better than hand-formed product as result of new designs developed within past three or four years. Description of tempering and assembling, testing and inspecting. Excellent photographs. E. F. LAKE, *Iron Age;* 5-18-22, 1750 w. APS.

Related Articles

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Breakage of Rolls on Sheet and Ton Mills. Part I. Discussion of characteristics of rolls used and methods of making and finishing them. Concave face when cold, but heat expansion causes straightening of face. Owing to differing rates of expansion of chilled surface and granular interior, rapid heating causes breakage, although torsional and bending stresses may contribute. Other causes are irregular operation, etc., all of which ultimately come back to improper heat conditions. W. H. MELANEY, *Blast Furnace & Steel Plant,* 5-22, 3000 w. APS.

New Five-Stand Cold-Rolling Strip Mill. This new 10-in. cold-rolling strip mill of the Greer Steel Co., Dover, Ohio, is unusual because it is a five-stand tandem design as compared with four-stand for ordinary cold-rolling practice. The predominating feature of the layout is the flexibility of the control, and this is due in large part to the fact that each mill stand has its own gear ratio. In addition, the drive was designed to take care of any reduction required, with spindles twice the usual length connecting pinion and rolls, and specially designed crab couplings. Further details of the installation and its products are given in the article. *Iron Age,* 5-11-22, 1700 w. MAH.



Millions of tons of pig iron produced each year since 1860, with estimated normal production represented by dotted line.—*(L. P. Ayres, vice-president, Cleveland Trust Co.)*

Brass Forging. Only successful method of forging brass consists in heating pill or slug in special furnace to 1250-1300° F. and then forging in this plastic condition. Small shapes are forged under 400,000 lbs. pressure, though larger pieces may be subjected to 400-600 tons. Not practical to forge shape over 4 in. in diameter or 3 lb. weight in 200-ton press. One press may produce 5,000 to 10,000 forgings per day. Die construction is fundamental consideration involved in forging brass. Design, workmanship and composition of steel are fundamentals in utility of such dies. High-speed tungsten steel should be used for actual section of forming die. Secondary parts may be made of cheaper steel. Intricacy of die determines its life. Low copper mixtures must contain between 56% and 63% copper, while high copper mixtures contain 87% to 100% copper. Physical properties of these mixtures are reported, and the microstructure of forgings discussed. O. T. RODER, *Forging-Heat Treating,* 6-22, 2000 w. CJW.

Cracks in Boiler Plates. Translation from Stahl und Eisen. Force influence figures developed by the new etching process worked out in the Krupp laboratories permit recognition of brittleness. Force influence bands showed up in new plates and were ascribed to cold working. From these tests and notched-impact tests authors conclude that manufacturers showed finish roll plates at as high a temperature as possible to increase toughness and reduce brittleness. Twenty-two excellent figures of specimens. B. STRAUSS and AD. FRY, *Forging & Heat Treatment,* 5-22, 3500 w. APS.

Arc Welding of Cast Iron. Discussion of carbon arc and metallic arc welding. Outline of general procedure recommended for doing metallic arc welding on cast iron parts. Ideal procedure would result in welds having following characteristics: Good amalgamation of metals, secured by proper filler material and preheating; prevention of chilled metal at line of fusion or in weld, by same means; preheating will also accommodate expansion in casting and the combination will eliminate gas pockets and holes. Proper filler material can be obtained which will approximate characteristics of original casting and which will have same coefficient of expansion. Electrode material for welding cast iron by arc process should contain high carbon and silicon and low sulphur, manganese and phosphorus. A R. ALLARD, *J. Am. Welding Soc.,* 1-22, 4000 w. CJW.

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LUMBER·WOOD PRODUCTS

The Danger in High Prices

ACCORDING to the *Furniture Manufacturer and Artisan*, lumbermen are opposed to an advance in the price of their product because they know that the attainment of high prices means, in certain lines of manufacture, the substitution of some other fabricated product for theirs, and frequently this temporary substitution is made permanent.

It is pointed out that substitution for lumber is occurring in many channels of industry in spite of all efforts to counteract it. Steel, for example, has replaced lumber permanently, it is believed, in passenger cars, largely in freight cars, agricultural machinery, automobiles, barrels and casks, telegraph and telephone poles, fences, office furniture, business and industrial buildings and in many other ways. Concrete replaces lumber in a large variety of uses. Wood pulp and straw board are used instead of lumber in boxes and other containers. The latest development of this kind is the radio, which is taking the place of the phonograph and even threatens the continued manufacture of pianos and other musical instruments, and the use of lumber in their cabinet work.

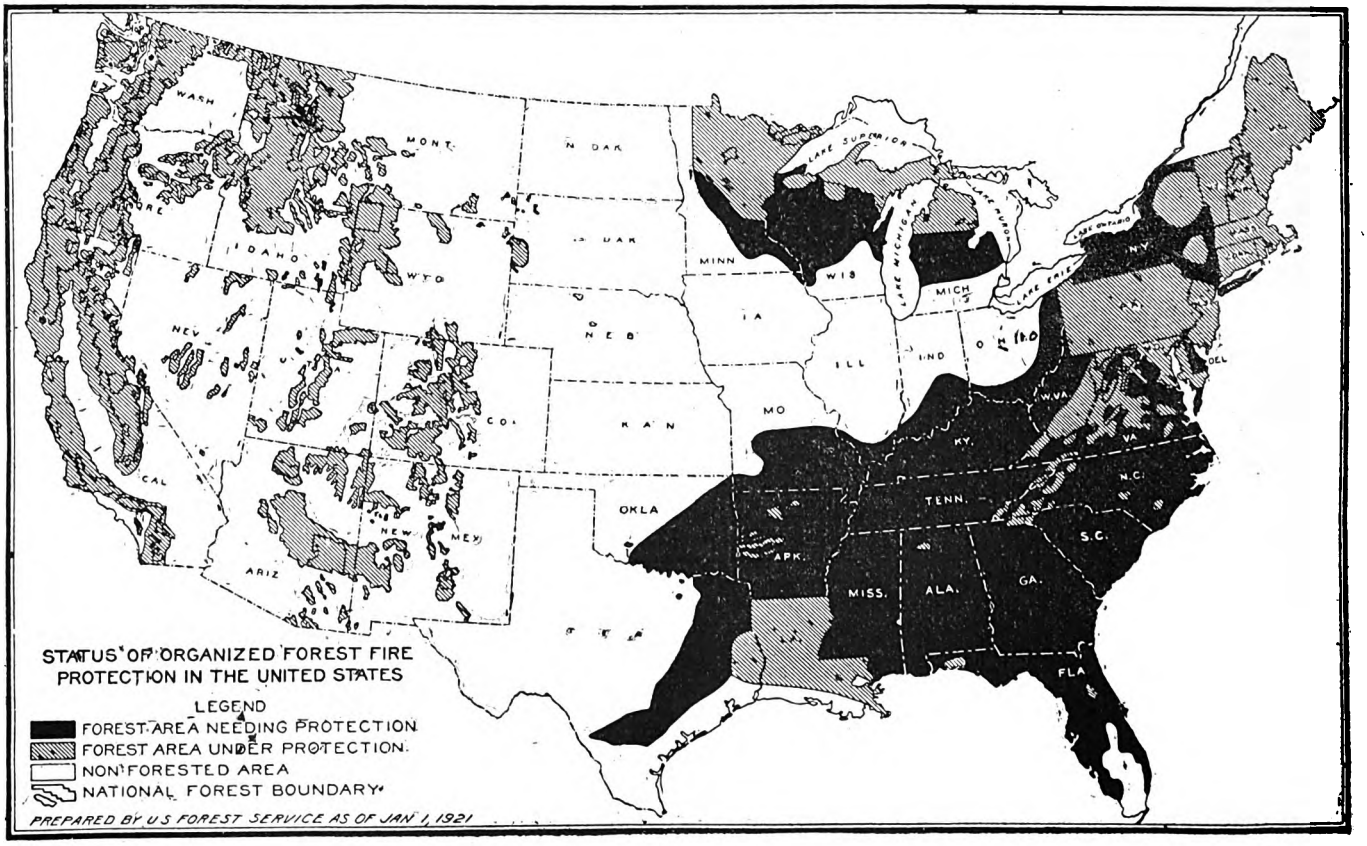
In many instances the price of lumber has had nothing to do with its disappearance from the industries referred to, but the substituted article has frequently been perfected while the article made of lumber has not been. In view of the present shortage of lumber, it is believed that consumption should be so adjusted to supply that nothing is wasted in manufacture, and also that no lumber should be produced beyond the wants of the public.

How Nature Produces Artistic Veneers. Beautiful figure found in some wood caused by vagaries of nature during growth of tree. Heavy winds and snowstorms responsible for some of markings. In other species of trees figure is produced when numerous small branches start to sprout and then cease growth in early life of tree. In some maples this rule is reversed—small projections on side of bark penetrate regular trunk growth and make irregular indentations, causing veneer cut from tree of this kind to be called bird's-eye maple. Another ornamentation in maple, birch and mahogany is formation of curls, often resulting in veneer bringing double price of ordinary stock. Curls formed by filling in of spaces between forks of branches, fibers of layers growing in regular whirlpool fashion. ALEXANDER H. KOLBE, *Furniture Manufacturer and Artisan*, 6-22, 1800 w. HHH.

Timber Trade in France. Production of timber insufficient for needs of country. Two million cubic meters imported. United States may establish export trade with France more easily if endeavor is made to produce quarter-sawed material, in order to secure price that will counterbalance depressing effects of freight. ALPHONSE MATHEY, *Wood Turning*, 5-22, 2600 w. HHH.

English Styles in Furniture. Rugged individuality of early England evidenced in furniture of English origin. Most important periods: Tudor, Stuart, Dutch, Victorian. English styles most adaptable of foreign furniture styles to average American home. ROBERT RENNSSELAER CHAMBERLAIN, *Grand Rapids Furniture Record*, 5-22, 2500 w. HHH.

Skilled labor at Southern pine mills decreased 22% during 1921 and common labor decreased 29%, while wages of farm labor were reduced 37%.—*American Lumberman.*



Vast forest areas need fire protection, especially the regions rich in yellow pine in the South.—*(American Forestry.)*

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MACHINERY

Machine-Tool Industry Back to Normal

A STEADY improvement is noticeable in the machine-tool industry. New orders are said to average between 20% and 25% of the peak business during war times. Six firms out of 77 recently canvassed stated that their business was more than 50% of peak business, while about 30 out of the 77 reported that they were doing a business that may be considered from one-third to one-half normal or better. Stocks have been materially reduced within the last two months. Nearly all the shops that were closed during the depression are now running to some extent and some of the largest report sales averaging 50% of what is considered normal.

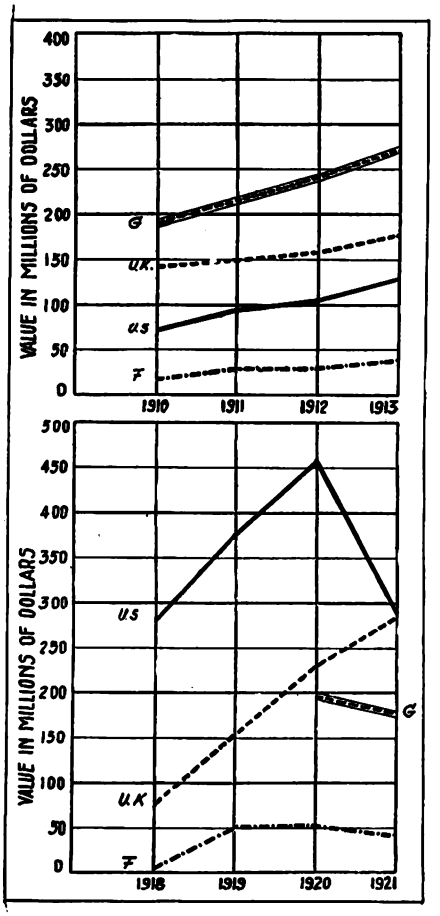
According to *Machinery,* conditions in the electrical welding-machine field are practically normal. Shops devoted to electric welding on a jobbing basis are also well occupied. The electrical repair and motor-rebuilding business keeps shops running at full capacity, and the electrical tool business averages about 50% of normal. The tap and die business averages from 25% to 40% of capacity. The makers of special tools, jigs and fixtures average about 50% of a normal business, and a few of these shops are running full and even overtime. The vise business appears to be practically normal. In the ball and roller-bearing field the activity is 100%, due mainly to the heavy demands of the automobile industry. The drop-forging shops are fully occupied and those engaged in making automobile forgings have difficulty in meeting the demands. There is considerable demand for forgings for railroad cars, large orders for which have been placed by the roads during recent months. The foundry business is much better and prices of castings have increased to a level that is said to be satisfactory by the foundry operators; and the die-casting business is operating at about 75% of capacity.

New Gear Material. Known as "Condensite celoron." Claimed to be practically water, oil and grease proof. Tensile strength 8,000 to 10,000 lbs. per square inch. Compressive strength approximately 40,000 lbs. per square inch, laminæ horizontal, and 2,500 lbs. per square inch, laminæ vertical. Transverse strength is approximately 23,000 lbs. per square inch. Modulus of elasticity is approximately 1,550,000 lbs. on the average of 10 readings. Specific gravity 1.3 to 1.4. Coefficient of expansion .000017 per degree F. Gears should never be meshed with gears of similar material or with gears having uncut or badly worn teeth. Face of mating cut metal gear should be always equal to or wider than condensite celoron gear. *Canadian Machinery,* 6-8-22, 500 w. CJW.

New Tests in Fatigue of Metals. Description of research work at the University of Illinois, also of the machines used. In the so-called Farmer rotating beam machine, it has been found that the endurance limit (to alternate reversals of stress) is almost identical with the elastic limit. The latter, on the other hand, is not the permanent and unchangeable quality it has been thought to be. Other interesting points discovered in the research work are mentioned. *Automotive Industries,* 6-8-22, 1600 w. MAH.

Safety Gates. Surface landing gates at Cresson No. 9 mine, operated by electricity. Rack and pinion provided in place of usual sprocket and gear. Plan shown in cut. Gate opens in 6 seconds. Motor speed 900 r.p.m., so that 90 revolutions of motor are required. Three-quarter hp. motor sufficient for purpose. Electric circuit usually left open. Diagram of control for gate shown. *Coal Age,* 5-11-22, 400 w. CJW.

Metallic Packing. Discussion of dura-metallic packing, which is self-lubricating, acid and alkali proof and successfully used at 800°F. New product is metallic gasket stuffed with rubber, flax, asbestos or other elastic materials, thus combining advantage of metallic gasket with resilience of rubber fibrous material. C. C. HALL, *Paper Mill,* 6-17-22, 750 w. CJW.



Machinery exports from Germany, United Kingdom, United States and France.— *(U. S. Commerce Reports.)*

Boiler-Room Instruments. Real value is not so much what instruments do as what executives do with instruments. Instrument records are likened to set of books in office, without whose aid keenest of executives would be unable to make any headway against constant encroachment of extravagant practice and inefficient methods. Have two distinct functions: Instantaneous reading indicated is of primary value to operating force; secondary value results from collection, interpretation and analysis of daily records, so that comprehensive record of operation is built up. Examples. D. HENDERSON, *Industrial Power,* 6-22, 1200 w. CJW.

Speeding Up Screw Thread Inspection by Optical Projection. A new tool for the inspection of screw threads in the Hartness screw thread comparator. Primarily, this is a device for supporting the screw or gear between a source of light and a projection microscope, with a special chart having tolerances indicated on it to receive the projected image. This arrangement makes it possible to see all the defects of the thread or tooth at a glance, and very largely magnified. Author describes the apparatus, its methods of use, general applications, and advantages. RALPH E. FLANDERS, *Automotive Industries,* 5-25-22, 3200 w. MAH.

Emergency Closing Valve. This valve can be made to close either when steam pressure in supply pipe to turbine falls any predetermined amount below minimum allowable operating pressure or when pressure of lubricating oil becomes dangerously low or finally when turbine overspeeds. It insures instant automatic protection and its importance as secondary protection for large turbine units cannot be overemphasized. Operation illustrated and applications discussed. P. W. KNAUF, *Intern. Steam Engineer,* 6-22, 1200 w. CJW.

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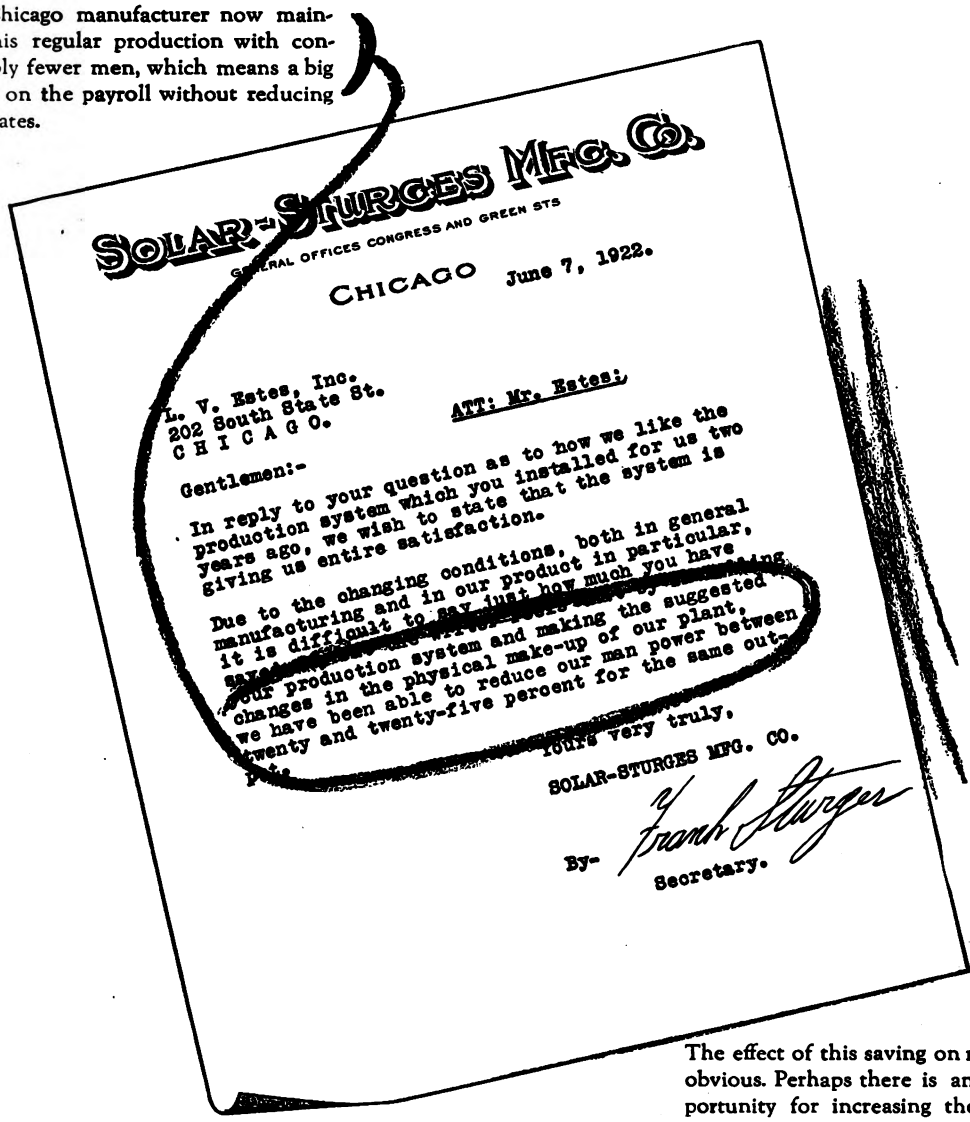
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Prospect of Higher Prices for Lead

THAT gradual curtailment in the production of lead will result in higher prices in predicted by *Mining and Metallurgy*. It is pointed out that the lead production of the world has not kept pace with that of either copper or zinc, and today the possibility of producing copper is nearly double that of producing lead. And at the same time new uses, especially the storage battery and lead-encased cable, are making large demands on the world's output. Nearly half of the total production of lead is corroded to make paint and storage-battery oxides, the remainder being used for foil, shot, storage batteries, lead-encased cable, solder, sheet lead, babbitt, etc. A small amount is still used for pipe and plumbers' supplies. Ammunition accounts for a very small part of the total supply. Storage batteries, since the advent of automobile self-starters, rank next to paint in the use of lead. Radio receiving stations, each of which requires a storage battery, appear likely to rival motor cars in the amount of lead consumed.

Conditions today seem to justify Herbert Hoover's prophecy in 1909 to the effect that the prospect of higher prices for lead were more encouraging than for any other metal. It is pointed out that in spite of the present general business depression the lead industry is now more prosperous than any other non-ferrous metal. This is due partly to the fact that although the war increased the production of lead it did not increase the capacity for producing, whereas its effect on both copper and zinc was to increase enormously the production capacities.

Geology and Mining of Mica. Mica is the one indispensable dielectric. Increasing demand without prospects of a suitable substitute. Muscovite or "white" mica and phlogopite or "amber" mica are most important industrially. Long list of uses in electrical and other industries. Ground mica has also numerous uses. The commercially valuable ores occur only in pegmatites. Many minerals associated with mica may be valuable by-products such as gem varieties of beryl and zircon, rare radium and uranium minerals, pure feldspar, high grade apatite. Methods of mining, evaluation of the mineral and distribution. Preparation for market, grading. Necessity for improved methods of mining and preparation. J. VOLNEY LEWIS, *Eng. & Min. Jour.-Press*, 5-20-22, 7000 w. APS.

Mining Thin Seams. System described applicable to seams varying from 18 to 36 in. in thickness with tender friable coal, under comparatively heavy to very heavy cover, inclination of seam varying from level to five degrees. If roof is of clayey nature, best method would be longwall, advancing or retreating. Should be cut by mining machines and loaded by face conveyors, either belt or shaker. Seam should be laid out in panels, each panel to have its own split of air current. Method of timbering and size of timbers must be carefully selected. Other details given. G. A. M. REES, *Coal Age*, 6-15-22, 1800 w. CJW.

Latin America Resources. First of series of three articles describing mineral resources of Latin America and analyzing economic factors on which their development is dependent. Dearth of transportation facilities. Greatest source of wealth is Chilean nitrate industry. Life of field estimated at 200 years. Copper may surpass nitrate in few years. Gold and silver declining because of high costs. Tin is one country product Bolivia, which is second only to Malay States in production. Has all necessary group of minerals around which iron and steel industry centers but lacks coal. Iron countries are Brazil, Cuba, Chile, Mexico and Venezuela. Only iron ores supplied to external commerce are from Chile. O. WILSON, *Chem. Met. Eng.*, 4-5-22, 2500 w. CJW.

Hydraulic Sand Packing. Brief discussion of proposition to fill in mines with sand, replacing ore taken out and providing place for sand removed from mine. Cost of hydraulic filling not appreciably higher than old hand-stowing of material in mine, while saving of time is considerable and less danger of mine fires. Little data on percentage of solids transported by water without danger of choking pipes. In this work 35% voids in volume of dry solids should be allowed. E. S. RIVETT, *Canadian Mining Jour.*, 4-28-22, 750 w. CJW.

Sulphur Dioxide Leaching Process. Discussion of process developed at Tucson, Ariz., to provide cheap and efficient method for treating so-called "porphyry" copper ores of Southwest, which generally contain both sulphide and nonsulphide copper minerals, mixed in such proportions that they can only be satisfactorily treated by method which will concurrently recover both forms of copper. Advantages of new method consists in: Plant is compact and not expensive, no installation difficulties, power requirements are light, operation simple and easily controlled, no delicate adjustments or critical points. Percolation difficulties common to leaching are entirely avoided. Perfect contact is assured between finest ore particles and reagent. Reagent is cheap and excellent utilization is attained. Process may therefore be extended to ores having much higher acid soluble gangue content than could be considered in ordinary sulphuric acid leaching practice. Details to be presented in Bureau of Mines Technical Paper 312. C. E. VAN BARNEVELD and E. S. LEAVER, *Reports of Investigations*, Bureau of Mines, No. 2350 (1922), 15 pp. CJW.

Methane Indicator. Burrell methane indicator, which measures amount of methane in mine atmosphere by means of graduated scale, contraction resulting from burning methane content of air being measured, has been formally approved by Bureau of Mines. Instructions for operation are given. L. C. ILSLEY, *Reports of Investigations*, No. 2367, Bureau of Mines. 3 pp. CJW.

Mechanical Loaders. Practical difficulty today consists in not being able to keep machine in continuous operation due to removal of loaded cars. Section of mine must be prepared for exclusive use of shovel. Locomotive should be kept in attendance on this machine exclusively. This must take sufficient number of cars into entry to clean up working face so that when last car is loaded they can be removed, leaving track clear for loader to move to new point. Plan is illustrated. Coal should be sheared before shooting. Loader permits of uniform and systematic advances, simplification of main haulage, ventilation, pumping, etc., and in new development, rapid increase in daily output and attainment of ultimate output in comparatively short time. Higher recovery is possible because of quicker working. W. R. CALVERLEY, *Coal Age*, 6-15-22, 1500 w. CJW.

Accidents and Diseases in Coal-Mining. Based on study in Utah. Increase year by year shown by following table:

	1917 1918	1918 1919	1919 1920	1920 1921
Deaths	17	24	28	32
Permanent total disability	0	0	0	2
Permanent partial disability	11	20	16	25
Temporary disability:				
28 days and over	111	165	192	206
14 to 28 days	139	150	273	199
4 to 14 days	509	446	545	505
Under 4 days	778	838	1,124	1,155
Total temporary disability	1,537	1,599	2,134	2,065

Days lost from accidents increased from 18,820 in 1917-18 to 26,641 in 1920-21. Production loss has increased from 101,816 to 140,931 tons in same period. Loss to employees likewise increased from $45,507 to $63,370, while total cost of accidents has risen from $741,808 to $881,027. A. L. MURRAY, *Coal Trade Bul.*, 5-16-22, 1000 w. CJW.

Many of the coal mines today are better ventilated than are numerous of the city office buildings—*Steam Shovel and Dredge Mag.*

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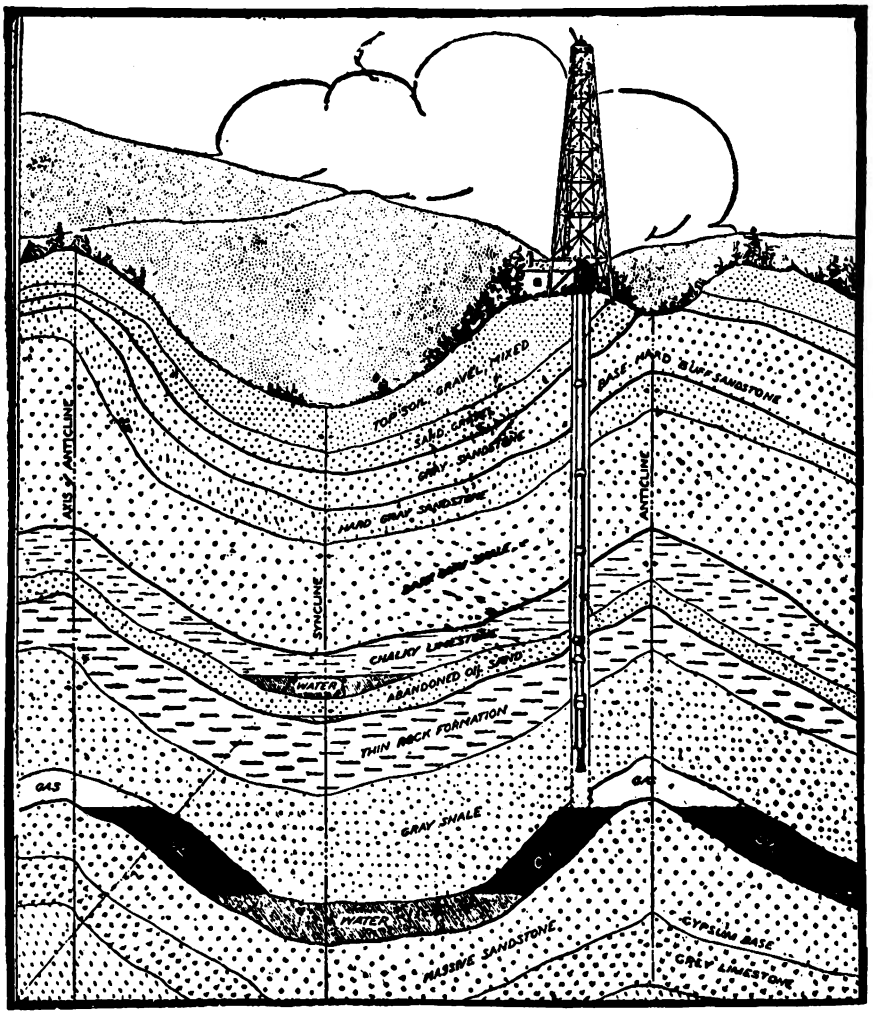
OILS·PETROLEUM

No Decline in Oil Prices Expected

ACCORDING to the *Magazine of Wall Street,* the outstanding feature of the oil industry is the paradoxical situation with regard to rate of production, supplies in storage waiting for market, and crude and refined oil prices. It is pointed out that "when production and storage supplies of any industry fall below normal the industry might be supposed to be 'statistically' strong; when they rise above normal the analysts of the trade might be expected to shake their heads solemnly and forecast a decline in prices." But the reverse appears to be true of the oil industry today. The production of crude oil in the United States has for a number of years been going forward in record-breaking proportions, and there is not at the present time any indication of a let-up. Over 1,450,000 barrels were produced per day early in June, while the average daily imports of 435,000 barrels from Mexico increased this supply to nearly 1,900,000 barrels. Meanwhile the consumption rate was only about 1,40,000 barrels.

But in spite of the fact that an excess production of about 500,000 barrels a day is accumulating, the price of oil has steadily increased. In the opinion of the writer, the explanation of this paradox lies in the fact that in former times whenever demoralization threatened, the dominant factors in the industry used to go out among the smaller independents and buy up their *refined* products. But about two years ago this policy was discarded in favor of one which called for the purchasing of crude instead of refined. So today prices are likely to stay up in spite of the large supplies of refined and crude oil on hand, because these supplies are in the hands of corporations equipped to hold them. There is almost no opportunity for the small or badly managed company to succeed.

Surface Tension of Petroleum. Value of specific tension increases with specific gravity. Small quantity of fatty acids and wax present does not appear to influence values. High boiling fractions and products of high viscosity tend to raise surface tension of lighter petroleum products such as gasoline and naphtha. Values decrease with increase in temperature, approximating 0.05 dynes per sq. cm. per degree F. Surface tension in conjunction with other tests may aid in determining lubricating and other values of oil. C. K. FRANCIS and H. T. BENNETT, *J. Ind. Eng. Chem.,* 7-22, 2500 w. CJW.



Tapping a dome into which gas and oil are forced by the hydraulic pressure beneath.—*(Magazine of Wall Street.)*

Analytical Distillation of Petroleum. Analytical distillation of petroleum is commonly made to determine range of boiling points or to separate oil into fractions for detailed examination, or both. This bulletin describes apparatus and methods used by Bureau of Mines for routine examination of crude and lubricating oil and describes also apparatus developed for certain types of research. Some of the methods for studying fractions separated are described, also for dehydrating emulsified oils, which is often necessary preliminary to analytical distillation. E. W. DEAN and others, *Bulletin 207,* Bureau of Mines, 1922, 82 pp. CJW.

Filters for Lubricating Systems. Two best methods are: Oil is continuously passed through filters or separators and all foreign material removed before oil is delivered to bearings and partial filtration system, in which portion of oil is continuously by-passed through filters and is automatically returned to system after being cleaned. Latter used where amount of impurities is very small and permits use of smaller and less expensive equipment. Oil should come out bright and clear. W. F. OSBORNE, *Power,* 6-13-22, 1000 w. CJW.

Lubrication Engineer. Two great general problems today are fuels and lubrication. Great deal of confusion in latter case. Introduction of mineral oils started complications. Simplification of practice has been mainly brought about by lubrication engineer. Primarily interested in all economies that can be effected through use of lubricants. Must know mechanics and oils. Must organize entire matter of handling petroleum products so there will be no waste of products in storage or in use. Also interested in reclaiming used products. WM. F. PARISH, *Intern. Steam Engineer,* 6-22, 2000 w. CJW.

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RUBBER · PLASTICS

Tennis Shoes Popular in Tropics

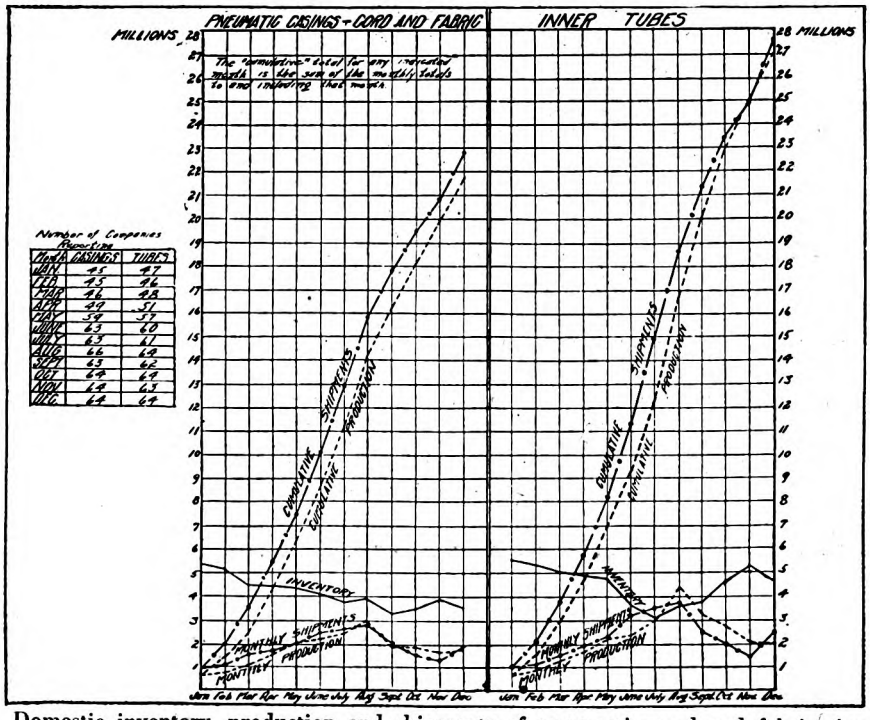
THAT a rapidly expanding market for rubber footwear is to be found in the tropics is indicated by recent export figures, which show that at the present time exports of rubber footwear amount to one-third of the value of exports of leather shoes. During the month of May the export of canvas shoes with rubber soles amounted to 232,952 pairs, worth $192,939; rubber boots were shipped to the extent of 25,408 pairs, worth $73,664; rubber shoes came to 42,291 pairs, worth $45,449, and rubber soles and heels amounted to $58,615.

Shoes of the tennis type constitute the bulk of these exports. The Philippine Islands were the best customers for these shoes, taking 64,000 pairs during the month of May. They were also one of our best customers for rubber soles and heels. Next in the list is Cuba, with 45,000 pairs of tennis shoes and the largest purchase of rubber soles and heels. Mexico and other tropical countries are also large buyers. England is third on the list with 35,000 pairs, of which it is believed many were reshipped to tropical countries.

According to *American Shoemaking,* these tropical wearers favor the tennis shoe because it is comfortable to the foot from the first moment of its wear. There is no uncertainty about its fit. The price, even with a considerable profit added, is reasonable. The tropical wearers' verdict is so unmistakable that it should offer encouragement to rubber manufacturers in this country who specialize in the production of what youngsters call "sneakers."

Rubber Containing Magnesium Carbonate. Light magnesium carbonate is light inorganic filler for rubber which has heretofore received little attention from American rubber technologists. Data is given showing that this material behaves as typical reinforcing pigment, increasing tensile strength, stiffness and resilient energy capacity of rubber with which it is compounded. Comparison between physical properties of this rubber with those containing zinc oxide, gas black, china clay and barium sulfate indicate that magnesium carbonate is exceeded in reinforcing properties only by gas black. Principal disadvantage is property of imparting high permanent set to vulcanized product, attributable to definite crystalline or nonamorphous character of particles. Believed that application of principles of colloidal chemistry to conditions of commercial process will enable this material to be prepared in amorphous form, which will make it much more valuable as rubber compounding material, by reducing objectionable permanent set and enhancing tensile strength and toughness of rubber compounded with it. H. W. GREIDER, *J. Ind. Eng. Chem.,* 5-22, 8000 w. CJW.

Onazote is a new form of rubber sponge, three times lighter than cork, a non-conductor of heat and cold and impermeable to water.—*Tractor World.*



Domestic inventory, production and shipments of pneumatic cord and fabric tire casings and inner tubes during the calendar year 1921. This chart of vital tire statistics was prepared by the Tire Manufacturers' Division of The Rubber Association of America, Inc., based on figures submitted by tire and tube manufacturers, as indicated in the small square at the left. In December the number of manufacturers making returns was more than 1.42 times greater on casings and 1.36 times greater on tubes than in January.—*(India Rubber World.)*

Polish Rubber Industry and Its Prospects for Development. An interesting account of the conditions existing in the Polish rubber industry at the present time, the demands for various sorts of rubber goods, the export outlook. *Rubber Age,* 4-10-22, 1500 w. IG.

Temperatures and Friction Losses Determined by Tire Research. This is summary of results on a number of articles on tire research work. Writer points out herein that tire problems divide naturally into two kinds: mechanical in which the tire user is largely concerned, and chemical in which the manufacturer is more largely concerned, even the automotive engineer not being greatly interested in the latter. *Automotive Industries,* 6-8-22, 500 w. MAH.

Temperature of Pneumatic Truck Tires. Since the use of pneumatic tires for trucks has become general, so that the very large truck sizes are now manufactured in large numbers, much interest has been displayed in the matter of heating. Of course all tires heat, but the big question has been do they heat in proportion to their sizes or internal air pressures. On either score truck tires could be expected to attain very high temperatures. This paper delivered before the S. A. E. describes methods used, results obtained, and other things incident to the general experiments. Over a period of several months, the highest temperature of any part of a 40x8 tire did not exceed 215° in a room which averaged 90°, so the highest temperature reached did not exceed room or atmospheric temperature by more than 135°, which is relatively cool. In another table of such differences, this figure is given as 96°, and that for a 42x9 tire as 123° maximum. F. O. ELLENWOOD, *Automotive Industries,* 6-8-22, 3200 w. MAH.

Rubber in Radio Sets. Hard rubber is unexcelled in the construction of various parts of radio sets. Great extent of industry opens up new and extensive uses for rubber. Soft rubber has but little use in radio work. *India Rubber World,* 5-1-22, 500 w. IG.

Gypsum. Part V. Covers chemical composition and use. JOSEPH K. COSTELLO, *Building Materials,* 5-22, 3000 w. CS.

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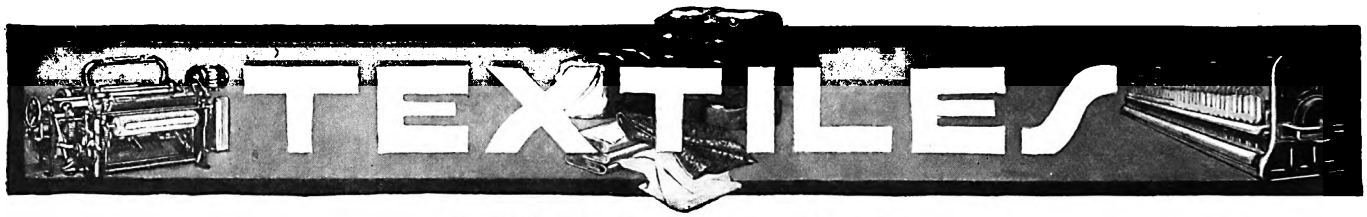
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Prospects for Cotton Crop Excellent

ACCORDING to the recent forecast of the Department of Agriculture, the cotton crop this year will be larger than in 1921. The yield, estimated on the condition of the crop on June 25, was forecast at 11,065,000 bales, which compares with a production of 7,953,641 bales last year, 13,439,603 bales in 1920, 11,420,763 bales in 1919 and 12,040,552 bales in 1918.

The condition of the crop on June 25 was reported as being 71.2% of normal, an improvement over the report issued the month previous, when it was placed at 69.6%. The condition compares with 69.2% on June 25, 1921, and with the ten-year June 25 average of 76.9%. It forecasts a yield per acre of about 151.9 pounds, compared with an acre yield of 124.5 pounds last year.

The acreage devoted to cotton this year was placed by the Department at 34,852,000 acres, an increase of 10% over the area planted in cotton last year. This increased acreage is regarded by the Department of Agriculture as a partial return to normal conditions, resulting from better prices and low stocks. Increases are shown in all States except South Carolina and Georgia. It is reported that the carry-over of stocks from last year has been cut in half, and that surplus cotton has practically disappeared.

The acreage devoted to cotton for the present season, as compared with the revised figures for previous years, together with the acreage harvested is as follows:

	Acreage Sown	Acreage Harvested		Acreage Sown	Acreage Harvested
1922	34,852,000	.....	1916	36,052,000	34,985,000
1921	26,519,000	31,470,000	1915	32,107,000	31,412,000
1920	37,043,000	35,878,000	1914	37,406,000	36,832,000
1919	35,133,000	33,566,000	1913	37,458,000	37,089,000
1918	37,207,000	36,008,000	1912	34,766,000	34,283,000
1917	34,925,000	33,841,000	1911	36,681,000	36,045,000

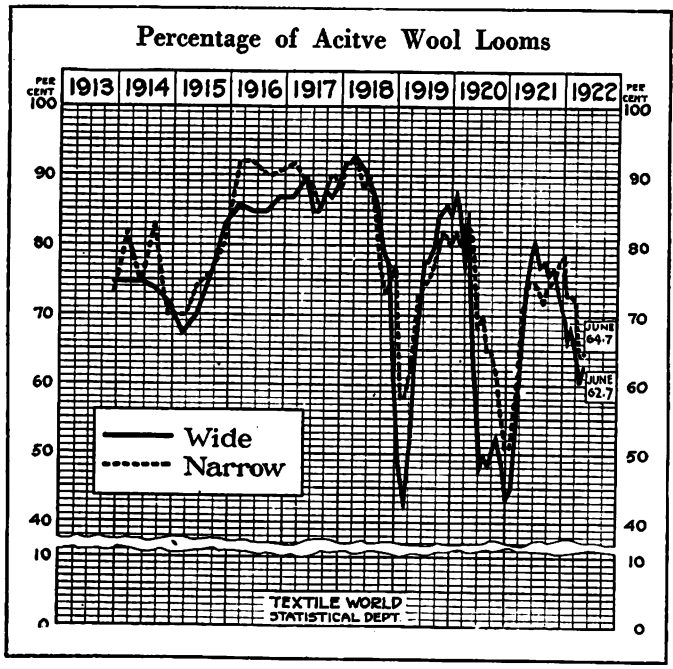
Yarn Breakage. In cotton warp dyeing, spongy or soft balling with overlapping ends should be returned for rewinding. Careful handling at boiling out box is absolutely necessary. Drums beneath boiling out liquor should be examined regularly for cracks or roughness, likewise squeeze rolls. Slack warps dangerous, especially in dyehouses which double warps after boiling out. Majority of breaks will naturally take place in actual dyeing. Care necessary here to keep all parts in perfect condition. Main cause of yarn breakage at dryer is warp running back and winding around steam dry cans. Constant supervision and careful handling all along line will eliminate much of this expensive fault. L. W. SIDEBOTTOM, *Am. Dyestuff Reporter*, 7-3-22, 1200 w. CJW.

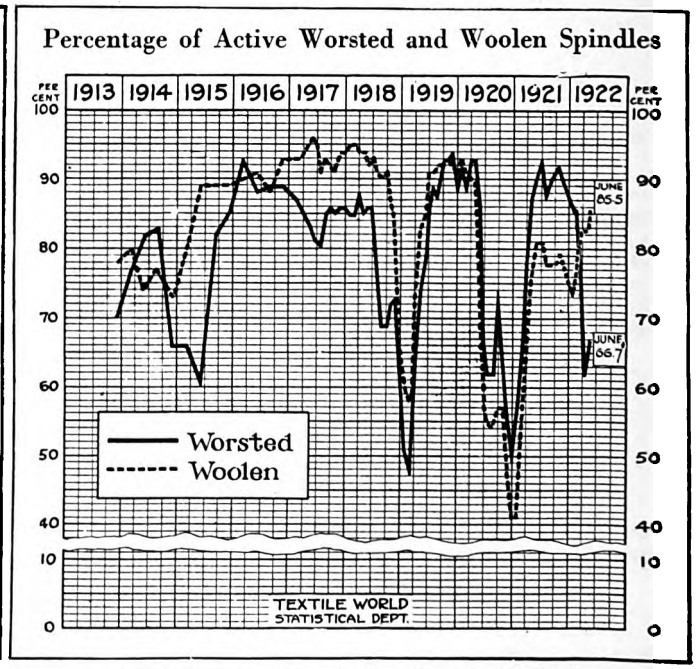
Warp Yarn Mercerizing. Process more mechanical than chemical, since mercerizing under tension is only application of process in practice. Description of processing warps for knitting trade. 40° Tw, is lowest concentration of caustic soda effective. Yarn in contact for two minutes. Caustic removed by washing on counter-current principle in four compartments, and then passing through 3% sulphuric acid at normal temperature. To obtain best luster, only combed yarns should be used, as fibers lie parallel. Singeing or gassing yarn prior to mercerizing adds considerably to resultant luster. This luster due to surface reflecting, brought about by swelling action of caustic soda and untwisting of fiber while under tension. LAWRENCE A. STEAD, *Southern Textile Bul.*, 2000 w. CJW.

Woolen and Worsted Cloth Finishing. Continued article. This installment discusses dewing, steaming and brushing, cutting, cropping and shearing machines. Original should be read. *Textile American*, 6-22, 7-22, 4000 w. CJW.

Specialty Yarns. These include changes in color, direction of twist and strength. These are comparatively level and regular in appearance, but there is also yarn spun to show thick and thin places at irregular intervals, "nep" yarns, with neps as an attraction, all of which are single yarns. Numerous effect yarns can be produced on comparatively simple doubling machines by utilizing expansion and contraction of threads of equal or unequal counts, according to amount and direction of twist. Examples are given. J. H. KERSHAW, *Textile American*, 6-22, 1200 w. CJW.

Dyeing Pulled Wool. Goods containing pulled wool to which particles of silk adhered gave trouble with two-bath process. Problem solved by bleaching with potassium permanganate, sodium bisulphite and sulphuric acid. Goods were then well rinsed and dyed as usual. G. E. TEMPLETON, *Am. Dyestuff Reporter*, 7-3-22, 300 w. CJW.





Percentage of active worsted and woolen spindles and of active wool looms, to June, 1922.—*(Textile World.)*

Keep Pace With Evolution

DARWIN declared the human race was merely an evolution of the monkey tribe. Some people agree with him. Others do not.

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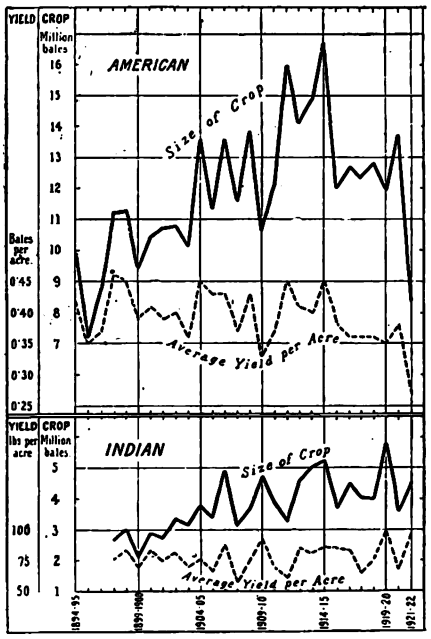
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Dyeing Acetyl Silk. General characteristics of present-day artificial silks. For direct cotton dyes, acetyl groups may be split off by caustic alkali; process does not affect luster of silk but fiber becomes more like other cellulose silks in physical and chemical properties. Basic dyes have direct affinity for acetate silk and no mordanting is necessary. Salt has remarkable effect in increasing absorption of dye by fiber. Discussion of colors produced by various dyestuffs. W. E. SANDERSON, *Am. Dyestuff Reporter*, 7-3-22, 1500 w. CJW.



American and Indian cotton crops and yields per acre since 1894.—*(Manchester Guardian Commercial.)*

Dyeing Artificial Silk. First of series of articles on dyeing mixtures containing artificial silk. Sulphide colors are suitable to dyeing artificial silk. These are fast to "acid cross-dyeing." The silk may be dyed after manner of cotton, providing certain precautions are taken, such as avoidance of heat, prolonged immersion and mechanical stress. List of dyes with relation to cotton and wool. General discussion of acetyl and viscose silks. GEORGE EMMONS, *Silk*, 6-22, 1500 w. CJW.

Theories of Dyeing. Three theories, chemical, mechanical and solid solution, briefly discussed. No one entirely satisfactory and all are far from expressing real truth. Do show how very complex are processes involved in dyeing textiles. *Canadian Dyer and Color User*, 6-22, 1000 w. CJW.

Formic Acid and Dyeing. Formic acid called acid of future. European dyehouses are using it more than American dyers. Formic acid much less harmful in its action upon textile fabrics than oil of vitriol or niter cake and nevertheless it exhausts dye bath satisfactorily. Users of formic acid state that more level dyeing, better penetration, brighter and bloomier shades are obtained, and that raw stock dyed with it spins and weaves better. In mordanting it exhausts bath well and at same time hurts wool but little. Formic acid is now being manufactured to meet demand which must increase as time goes on. Mills will do well to investigate thoroughly possibilities of formic acid. GEORGE H. JOHNSON, *Am. Dyestuff Reporter*, 7-3-22, 2000 w. CJW.

Two-Color Dyeing. Brief report of discovery of A. G. Green of new class of dyes which will enable dyer to give permanent color to artificial silk. The "ionamines" dye silk yellow and cotton blue in the same bath. *Canadian Dyer and Color User*, 6-22, 750 w. CJW.

Control in Piece Dyeing. In dyeing piece goods varying temperatures of the dye liquor are responsible for many irregularities in finished shade. Discussion of modern mechanical devices combining time and temperature control. N. INCOLL, *Am. Dyestuff Reporter*, 7-3-22, 1500 w. CJW.

Job Dyehouse. General description of equipment for various classes of work and various operations, such as scouring, bleaching, dyeing and finishing. A. T. BRAINERD, *Am. Dyestuff Reporter*, 5-22-22, 3000 w. CJW.

Fastness of Colors. Recommendations of German commission for series of tests of fastness of color, covering following points: Washing and boiling test for fastness of colored cottons; washing test for fastness of colored wools. The following data are established for this test: Colored wool against white wool, and white cotton. Rinsing tests in cold water for colored cotton and wool. Rubbing test for cotton and wool. Ironing tests. Testing fastness with sulfur. Perspiration tests for colored cotton and for dyed wool. *Canadian Dyer and Color User*, 6-22, 1200 w. CJW.

Direct Blacks on Cotton. Direct blacks used in dyeing of jet blacks, grays of different shades and fastness, ground for aniline blacks, compound shades, as matching color covering in calico printing, and as ground to be discharged in calico printing. Discussion of these uses. Plant for jet blacks with substantive colors illustrated, and advantages enumerated. R. SANSONE, *Am. Dyestuff Reporter*, 6-5-22, 2000 w. CJW.

Thin Boiling Starch. Better weaving warps made by using thin boiling starch than those sized with thick boiling or crude starches. Various methods used to modify ordinary cornstarch into thin boiling variety. Distafor used with some success, also chloride of lime; addition of dextrim to ordinary mixing will also thin starch, but these processes weaken size and produce variable results. Long boiling, without use of chemicals, under easy control and produces uniform thin starch. *Textile American*, 5-22, 1200 w. HHH.

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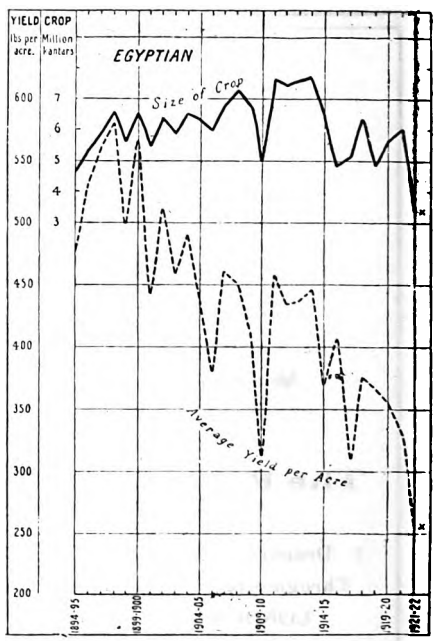
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Spindle Selection and Care. Discusses hand-driven spindles. Round-bottomed and V-shaped whirls; feathers on whirl jackets, bobbin seats, oil nozzles, blade-locks, knee-brakes are discussed. Putting in new spindles; care and repairs; oiling. Fifteen figures. *Cotton*, 5-22, 5500 w. APS.

Ring Spinning. Description of whole procedure based on wide practical experience, followed by practical everyday working of ring frames. First installment covers attending to new spindles, method of cleaning, bolster nuts, spindle construction, various kinds of ring frame spindles, importance of first oiling of spindles, correct replacement of blades and tubes and pouring oil in bolsters. *Textile American*, 6-22, 1000 w. CJW.

Modern Shop Practice in Building Revolving Flat Cards. These are machines for carding cotton fibres, and as such are widely used in textile plants. The article traces the history of carding from the original hand tools to the first machine, and thence down to date. The machines are illustrated and described, as well as the methods used in driving them, in operating them, the space required, and other interesting information, but mainly from a machine-tool manufacturing standpoint. F. E. BANFIELD, JR., *Mechanical Eng.*, 5-22, 4400 w. MAH.

Story of Manila Hemp. General brief description of production of hemp. Primitive conditions still surround present day production. Decorticating machines making little headway. C. D. ORTH, *Cord Age*, 5-22, 2500 w. CJW.



Egyptian cotton crop and yield per acre since 1894. Official estimates from which this chart was made are believed to be understated, the general expectation now being about 4,000,500 kantars.—*(Manchester Guardian Commercial.)*

Textile Trade Practice. Comparison of methods used in British and Canadian industries. B. X. C. BAILY, *Canadian Tex. Jour.*, 4-11-22, 3000 w. WRR.

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A Hundred Millions for Good Roads Next Year

THE continuation of Federal aid for road construction has resulted in the recent authorization of an appropriation of almost $50,000,000 for distribution among the several States during the fiscal year beginning July 1, 1922. Under the conditions of the aid each State must match the sum allotted it. It is estimated that $100,000,000 will thus be spent throughout the country during the coming fiscal year.

The Post Office appropriation bill recently signed by President Harding authorizes an appropriation of $65,000,000 for road building during the year beginning July 1, 1923, and $75,000,000 for the succeeding fiscal year. The conditions are the same for all three years and with an equal amount appropriated by the States will bring the total amount expended, if the States expend equal sums, to $380,000,000.

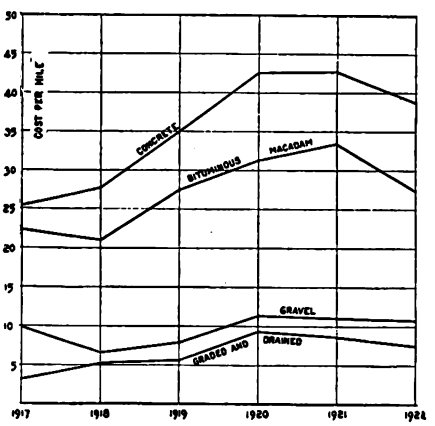
It is estimated that these appropriations will result in the construction of 71,000 miles of roads—nearly 40% of the estimated 80,000 miles of good roads included in the system of Federal aid roads now being planned.

The apportionment to be made to the various States for the fiscal year which began July 1 is approximately as follows:

Alabama	$1,035,614	Nebraska	1,054,126
Arizona	702,188	Nevada	635,624
Arkansas	836,095	New Hampshire	243,750
California	1,641,399	New Jersey	628,581
Colorado	894,117	New Mexico	793,216
Connecticut	320,599	New York	2,464,299
Delaware	243,750	North Carolina	1,139,556
Florida	591,217	North Dakota	776,476
Georgia	1,331,972	Ohio	1,882,003
Idaho	625,691	Oklahoma	1,168,226
Illinois	2,164,187	Oregon	788,443
Indiana	1,305,904	Pennsylvania	2,265,969
Iowa	1,401,915	Rhode Island	243,750
Kansas	1,401,521	South Carolina	707,492
Kentucky	944,786	South Dakota	802,707
Louisiana	664,660	Tennessee	1,098,461
Maine	463,440	Texas	2,950,115
Maryland	427,086	Utah	566,278
Massachusetts	730,784	Vermont	243,750
Michigan	1,499,688	Virginia	971,219
Minnesota	1,415,731	Washington	735,806
Mississippi	863,271	West Virginia	534,906
Missouri	1,632,086	Wisconsin	1,263,211
Montana	1,031,257	Wyoming	623,078
Total			$48,750,000

Highway Transportation Research and Automotive Progress. Author says that the industry must form the habit of thinking of the vehicle always in relation to the highway. Such a method of thinking would give the highway its proper position in the perspective. Traffic surveys have been sporadic, but now are being improved in character and usefulness. According to these surveys March and April are the months of average traffic. Surveys generally show trucks to be overloaded. This is bad for the roads, especially when a considerable portion of the trucks are of very large capacity. Fuel consumption is closely related to road design and construction; also poor roads make for higher fuel consumption. Author takes up in some detail Maryland, Connecticut, California and other surveys. Other subjects treated include road costs, store door deliveries, container cars and others. H. S. FAIRBANK, *Automotive Industries,* 6-8-22, 10,300 w. MAH.

Jack-Knife Crane Solves Problem of Restricted Space. This is a description of a novel crane which was designed and built for the Government commission supervising the Mississippi-Warrior River service. Much of this work necessitated the handling of many small packages and others up to ten tons between a vessel and a freight shed built close to the water's edge. To operate successfully, it had in addition to be of such a nature as not to interfere with the vessel's rigging, boat stanchions, or other apparatus attached to vessel or dock. The floating form of crane which the Robins Conveying Belt Co. designed and built for this unusual situation is of the jack-knife type and is erected on a floating power-driven barge, one of the old barges propelled by producer gas being used. The article describes barge, crane and its operation. *Engineering News-Record,* 4-20-22, 750 w. MAH.



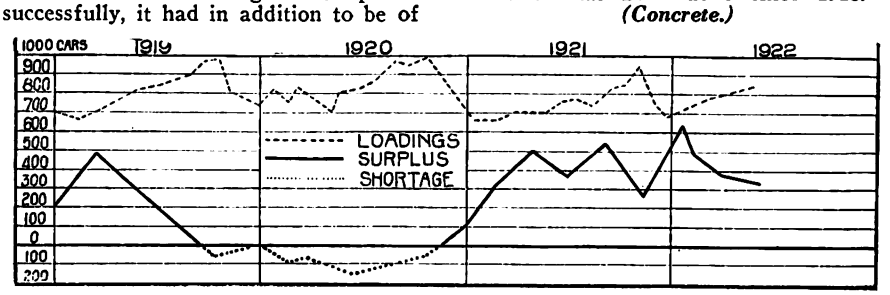
Variation in cost per mile, in thousands of dollars, on four types of pavement. The Bureau of Public Roads of the U. S. Department of Agriculture recently reported as completed since 1916, 11,017 miles of Federal-aid road and gives mileage of each type and average cost per mile. Figures based on large volume of work and are most recent, giving average costs for the whole United States. Figures cover entire cost of construction, excluding large bridges; in a few cases cost of engineering is not included. Figures are based on entire period of operation of Federal-aid, but major portion of work has been done since 1918.—*(Concrete.)*

Distribution of Wheel Load on Pavement Sections. Results of tests on Bates experimental road to indicate effect of traffic. Illustrated with typical curves. H. F. CLEMMER and C. A. HOGENTHALER, *Highway Engineer & Contractor,* 6-22, 2000 w. CS.

History of Conveying Belts. Development of the use of belts in conveying coal, coke, ore, crushed rock and vessel loading is traced historically. T. ROBINS, *India Rubber World,* 5-1-22, 2400 w. IG.

The continent of Asia, nearly six times the size of the United States, has only one-fourth the railway mileage of this country.—*Tractor World.*

Operation of Single Phase Interurban Lines. Details of operation of Chicago Lake Shore and South Bend Railway are given. C. N. WILCOXON, *Electric Traction,* 6-2-21, 6,000 w. IG.



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Exports, Imports

(From page 1290)

Machinery

ALTHOUGH there is at present no market for American machinery in Belgium, owing to the fact that considerable stocks of American machinery have accumulated there, appreciation of American equipment, even at higher prices, is indicated by the fact that at the recent commercial fair one of the best known Belgian manufacturers sold no lathes whatever, while several purchasers were found by representatives of American manufacturers. Orders of machinery for restoration purposes appear to have been concluded. Some shop construction is reported, however, in the vicinity of Brussels, and a certain amount of buying for replacements and development is being done by producers of light mechanics. It is believed that moderate price concessions would somewhat extend sales of American shop equipment in this district.

Australia presents an expanding market for machinery, as shown by the latest Australian statistics. A large increase is noticeable in the value and percentage of machinery imports from the United States in 1921 as compared with pre-war figures. In 1913 American manufacturers furnished machinery valued at $1,245,516, or 29% of the total, as against $3,884,396, or 43%, in the fiscal year ending June 30, 1921. Great Britain and the United States practically monopolize the Australian machinery market.

Oils, Petroleum

THERE is a good market for lubricating and paint oils in the Swansea district of Wales, which is a center for steel works, tinplate works, sheet works, tube works, copper works and nickel works. These industries consume large quantities of lubricants. The district also has several ports where lubricating oils are purchased for vessels. Considerable quantities of paint oils and paints are also consumed annually for repair work on vessels.

The oils consumed in this market are chiefly of British manufacture, though considerable quantities of American oils are used, and the latter is in good repute.

Paper

THE market for stationery in Arabia is steadily increasing. At present it is supplied principally by Great Britain, India, Italy and Austria. The United States has just entered this market and operates mainly through jobbers in England. The city of Aden is the principal market in this district. Imports of stationery into Aden amounted to 22,768 lbs. in 1919-1920, and 22,768 lbs. in 1920-21 compared with only 3,595 lbs. in 1913-14. It is believed that the figures for 1921-1922 will show a further increase, due, in great measure, to the attention being paid to education.

Rubber

A VERY good market for rubber goods is to be found in China. The value of the total imports of rubber manufactures in China in 1920 was $2,075,067, of which approximately 42% came from Japan and 30% from the United States. The general distributing centers for rubber goods are Shanghai, Tientsin, and Darien.

Due to the prolonged rainy season a good market for galoshes exists in Damascus. It is estimated that about 10,000 pairs were sold last season. Russian galoshes formerly ruled the market because of the resistance they offered to the wear of the bad streets, but the closing of the Russian source of supply has brought the American article into prominence.

Textiles

THERE is a demand for high-grade cotton goods at present in Venezuela. Imports are supplied chiefly by the United States and England. Other countries in which very good markets for cotton piece goods may be found are Rumania, China, and India. Official trade statistics for the Indian fiscal year, April, 1921, to March, 1922, indicate that India's imports of cotton piece goods have reached their lowest level and that from now on improvement may be expected.

New Charting Plan

(From page 1282)

cannot be stored up and used out of stock; there is no time lag between its production and use."

A glance at the curves on the chart on page 1282 shows considerable variations throughout the year. The curves for the years 1919 and 1921 can be considered as characteristically portraying central station load curves and the effect of the longer summer days when less electricity is used for lighting.

The trend of these curves can be readily seen—a decline as the summer months approach and a corresponding rise toward the end of the year. The steep declines in the last weeks of November and December are due to the shutting down of the factories for the holidays.

The 1920 curve, however, is not normal, as it drops below normal as midsummer approaches; beginning in November, it drops to the end of the year. The whole curve for 1920 shows clearly that an abnormal condition prevailed throughout that year.

The curve for 1922 is the most interesting, for, rising sharply during the second week in January, the trend is almost horizontal across the chart, contrary to what would be expected under normal conditions. As with the 1919 and 1921 curves, we would expect the 1922 curve to drop about the middle of January, but instead it fluctuates, with the trend horizontal. Due to longer daylight there had been a proportionate reduction in the use of electricity for lighting since the middle of January, 1922, but for a few weeks prior to the end of March, shops and factories of all kinds were using more electricity for power purposes, because of the addition of new machinery and longer working hours. This means "the employment of more men and, consequently, the output of a greater volume of manufactured product for the whole community."

From this graph, measured in kilowatt hours, the conclusion may be drawn that business is improving in Cleveland. The kilowatt hour records facts and in all probabilities it will not be long before this plan of gauging the trend of business conditions by the kilowatt hour, will be adopted in all the large cities.

Business in Brazil

(From page 1280)

Perhaps they will be able to gather a few useful hints from the following, published by the Brazilian Ministry of Agriculture, Industry and Commerce under the title "Practical Suggestions to Exporters:"

"If American exporters to Brazil suffer by contrast with their rivals in other countries, this is due chiefly to the recent entry of the United States into the field of international trade. An imperfect acquaintance with Brazilian business houses, commercial traditions and customs, as well as with the more general conditions, tastes and preferences of the Brazilian people, are at the bottom of the major part of the misunderstanding which has arisen in the past.

"Another factor, less important *per se* than for the effect which it has had in creating a general impression, are the inevitable cases of abused confidence arising from attempts of unscrupulous exporters to exploit a distant market, or of similar importers to take advantage of conditions unknown to their suppliers on the other side.

"The proof of the truth of the above statements is the well-known fact that American houses of high standing which have had sustained relations with Brazilian houses of the

same class, are at no disadvantage as compared with rivals.

"The important factors in foreign trade are the price and quality of the goods; tastes and preferences of the foreign market; and the terms of payment. It is probably true that the American exports is disposed to place greater emphasis on the price and quality of his goods as his strong selling points than to make concessions to the preferences of his customers or terms most agreeable or usual in Brazil.

"It should be carefully noted, however, that the last two factors often outweigh the others in the Brazilian importer's mind, when he is making a decision between competitors. The tastes of the Brazilian market is a matter to be studied in detail in the case of each commodity, and general statements cannot be made.

"Regarding the last factor, terms of payment, it may be worth while to point out certain facts pertaining to trade with Brazil.

"The important variations in practice between American exporters and certain European rivals have to do with credit terms, disposition of documents, and adjustment of claims.

"Credit, when extended to Brazilian houses by American exporters is usually on a basis of 60 to 90 days sight draft, or 120 days date draft, and these terms are satisfactory.

"The American exporter, however, has been much more reluctant to grant credit than were his European competitors, especially the Germans. The latter, on a basis of intimate acquaintance with the market, would accept a very much lower rating than American houses care to do. With the coming of American banks to Brazil in recent years, the handicap of insufficient information no longer exists, and the most reliable and accurate information is now available regarding all important firms of Brazil.

"Furthermore, a large part of European business with Brazil before the war was done on open account, usually with a limit of six months, which was even extended to one year in the case of some articles, such as textiles, pianos and machinery. In one Brazilian center it is said that quite one half of Germany's business was done on this basis. American exporters do little business on open account as yet.

"The primary consideration with Brazilian houses in asking for credit is the length of time necessary to inspect and clear the goods from the Custom House. This may require from 30 to 60 days after the arrival of the goods in Rio. Rarely do Brazilian houses ask for a longer time than is necessary for clearance and arranging the goods in stock, but credit for this period is considered indispensable, and general it will be difficult to trade on any other basis.

"The following quotation from a report by an American Consul reveals another side of the credit situation in Brazil: 'Brazilian houses which do an immense business and have no need to solicit credit still continue to do so out of force of habit. It is a custom inheridted from the past. While the practice of American exporters of arranging their export lists to permit a graduated series of discounts, varying with the length of the credit terms, is unquestionably beginning to influence many Brazilian importers to meet their terms, the old conservative practice is deeply rooted.'

"Another point upon which many Brazilian houses are sensitive is the disposition made of documents. European houses make a practice of sending them direct to the customer, and not attaching them to the draft. The importer usually insists on seeing the goods before accepting the draft, and provision for this should be made by the exporter, either by authorization or by sending documents direct to the purchaser.

"Interest rates for the period of the draft are usually included in the price rather than collected direct.

"Commercial letters of credit, as provided for by the American banks, are becoming increasingly popular with the large Brazilian merchants as a means of financing imports when sufficient inducements are offered by American exporters.

"Finally, emphasis should be laid upon the exact compliance with instructions given to the exporter by the Brazilian importer regarding measurements, weights, quality, packing and invoices. Upon the exporter's faithful attention to these particulars often depends the salability of the goods in Brazil, and a large percent of the complaints registered against American business has to do with this point. Articles 'just as good,' or even better than those ordered, and which the domestic buyer in the United States would be glad to have sent him without the delay of correspondence, are likely to be entirely useless in Brazil."

The Business Weathervane

(*From page 1263*)

The Unfavorable Factors Are: 1. Competitive bidding for labor in the building trades. This competition has enormously increased prices for labor in these trades and is causing a construction cost which might require deflation when conditions ease off and rentals lower. 2. The continued coal and textile strikes. The voluntary idleness of men is a great burden on the income of the country and a situation that ought not to exist. Despite the strike, coal production is increasing; yet the heavy toll of these strikes should lead to an effort to find some better method for the settlement of labor disputes. 3. The failure of the bankers' conference in Paris to reach terms upon which a German loan could be floated brings a set back in the economic situation which must be recorded as an unfavorable symptom the world over. 4. The continued unsettlement of financial and business conditions in Europe is fast becoming serious, and a crash is unavoidable unless there is a springing to the necessity of the situation and some plain talk on the part of the nations most deeply interested. Among them our country must be included. 5. Pending tariff and bonus legislation which tend to restrain business because responsible for uncertainties. 6. A rise in the prices of finished product, together with the slight increase in the cost of living.

In the opinion of **Dun's Review,** the month of June was noteworthy for the preponderance of advances in Dun's weekly lists of wholesale commodity quotations, and the rise in the July 1 index number had been plainly foreshadowed. The net result was an increase of 2.2%, following a moderate upturn in the two immediately preceding months, and the general price level is now higher than at any previous time since April 1, last year. Examination of the record shows that the downward price reaction which began in the early summer of 1920 culminated about a year later, and the subsequent trend has been almost steadily toward recovery.

What Constitutes a "Spread"?

(*From page 1277*)

or otherwise, sold in the stores which support the organization has been estimated as probably less than 5% of the entire volume of goods handled by such stores, thus proving conclusively that the department stores are not dependent on imported merchandise for their livelihood."

The Dry Goods Association states that it is opposed to the proposed tariff because its rates have not been constructed in a scientific, non-partisan, non-political manner; because it carries higher rates on most finished products than a sound protective principle requires; because it will tend to raise prices to the consumer; because it will tend to restrict imports necessary to the international commerce of the United States and in so doing will damage the interests of all those on whose exportable surplus the international price has a vital and direct influence, such as the farmer, the cotton grower, the producer of metals, the exporting manufacturer.



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The INDUSTRIAL CALENDAR

Secretaries of Associations are invited to send us the dates of their conventions as early as possible so that their conventions may be properly listed below. When especially requested by Association Secretaries, we will send dates and other available notices concerning meetings of other associations.

July 25-28. *National Retail Tea & Coffee Merchants Assn.*, Hotel Statler, Detroit, Mich. (R. M. Heizer, Secretary, 1201 Cornell Ave., Indianapolis, Ind.)

July 26. *Western Pine Manufacturers' Association*, Portland, Ore.

July 27-28. *National Lumber Manufacturers' Association*, Portland, Ore.

July 31. *Wall Paper Manufacturers' Assn. of the United States*, Hotel Commodore, New York.

Aug. 7-11. *Universal Craftsmen Council of Engineers*, Cleveland, O. (Thomas H. Jones, Sec., 33 Linden Ave., Cherrydale, Va.)

Aug. 7-25. *National Merchandise Fair*, Grand Central Palace, New York. (Lew Hahn, Director, 200 Fifth Ave.)

Aug. 9-10. *National Association of Window Glass Mfrs.*, Atlantic City, N. J.

Aug. 12-14. *International Mounmental Granite Producers' Assn.*, St. Cloud, Minn.

Aug. 13-19. *American Ceramic Society*, summer excursion, New York State and Canada.

Aug. 15-17. *Memorial Craftsmen of America*, Springfield, Mass. (T. E. Cassidy, Secretary.)

Aug. 22-25. *International Assn. of Municipal Electricians*, New Bedford, Mass.

Aug. 23-25. *American Association of Railroad Superintendents*, Kansas City, Mo. (J. Rothschild, 400 Union Station, St. Louis, Mo.)

Aug. 24-25. *Canadian Gas Association*, Hamilton, Ont. (G. W. Allen, Secretary, 19 Toronto, St., Toronto, Ont.)

Aug. 28-Sept. 2. *Graphic Arts Exposition*, Mechanics Building, Boston.

Aug. 28-Sept. 2. *National Safety Council*, Detroit, Mich. (S. J. Wiliams, Sec., 168 N. Michigan Ave., Chicago, Ill.)

Sept. 1-7. *Natural Gas and Petroleum Association of Canada*, Niagara Falls, N. Y. (S. A. Morse, Secretary, 48½ Market Square, Chatham, Ont.)

Sept. 4-9. *American Chemical Society, Pittsburgh, Pa.* Divisional meetings will be held at Carnegie Institute of Technology and general meetings at Carnegie Music Hall.

Sept. 4-9. *Gas and Fuel Section of the American Chemical Society*, Pittsburgh, Pa. (Dr. R. S. McBride, Secretary, Colorado Bldg., Washington, D.C.)

Sept. 7-9. *New York State Coal Merchants' Association*, Richfield Springs, N. Y. (G. W. F. Woodside, Secretary, Arkay Bldg., Albany, N. Y.)

Sept. 11-15. *Association of Iron and Steel Electrical Engineers*, Cleveland. (J. F. Kelly, Secretary, Empire Bldg., Pittsburgh.)

Sept. 11-16. *Bakery Equipment and Material Exposition*, Municipal Pier, Chicago, Ill. (B. M. Warner, Secretary, Conway Bldg., Chicago, Ill.)

Sept. 11-16. *National Exposition of Chemical Industries*, Grand Central Palace, New York. (F. W. Payne, Sec., Grand Central Palace, New York.)

Sept. 11-16. *International Assn. Printing House Craftsmen*, Boston.

Sept. 12-14. *Retail Bakers of America, Chicago.* (J. M. Hartley, Secretary, 10 S. La Salle St., Chicago.)

Sept. 12-15. *American Bakers Assn., Chicago.* (H. E. Barnard, Secretary, 1135 Fulliton Ave., Chicago, Ill.)

Sept. 19-22. *Pacific Coast Gas Assn.*, Santa Barbara, Cal. (W. M. Henderson, Secretary, 445 Sutter St., San Francisco, Cal.)

Sept. 21-23. *American Electrochemists Society*, Hotel Windsor, Montreal, Canada.

Sept. 23-27. *National Assn. of Cost Accountants*, Atlantic City, N. J.

Sept. 23-30. *New York Closed Car Show*, Grand Central Palace, New York.

Sept. 25-29. *National Association Retail Druggists*, Detroit, Mich. (S. C. Henry, Secretary, 168 N. Mich Blvd., Chicago, Ill.)

Sept. 25-30. *National Association Advertising Specialty Mfrs.*, Chicago, Ill. (B. Blackwood, Secretary, 208 S. LaSalle St., Chicago, Ill.)

Foreign Events

August. *International Fair*, Hamburg, Germany.

Aug. *Second Sample Fair*, Lublyana (Leibach), Yugoslavia.

Aug. 12-20. *Third Annual Sample Fair*, Liberee (Reichenberg), Czechoslovakia.

Aug. 27-Sept. 2. *Autumn Fair*, Leipzig, Germany.

September. *Sociedad Rural Argentina*, Buenos Aires, Argentina.

Sept.-Nov. *Engineers Congress*, Rio de Janeiro, Brazil.

Sept. 7-Nov. 12. *International Exposition (centennial)*, Rio de Janeiro, Brazil.

Sept. 15. *International Fair*, Bandoeng (Java).

Sept. 15-20. *Automobile Show*, The Hague, Holland.

Sept. 18-23. *Second Annual Metting of the International Chamber of Commerce*, Rome, Italy.

Sept. 21. *Textile Fair*, Hamburg, Germany.

Sept. 22-25. *Fifth International Fur Fair*, Lucerne, Switzerland.

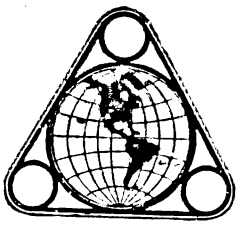
Sept. 25-Oct. 3. *Automobile Show* at the Kaiserdamm Hall, Berlin, Germany.

Oct. 1-15. *General International*, Lyons.

Oct. 4-15. *Automobile Show*, Grand Palais, Paris, France.

Oct. 12-23. *International Commercial Vehicle Exhibition* at Olympia, London, England.

The
J. G. White Management Corporation



INVESTIGATIONS AND REPORTS ON THE UNDERLYING CONDITIONS AFFECTING PROFITS AND INVESTMENTS

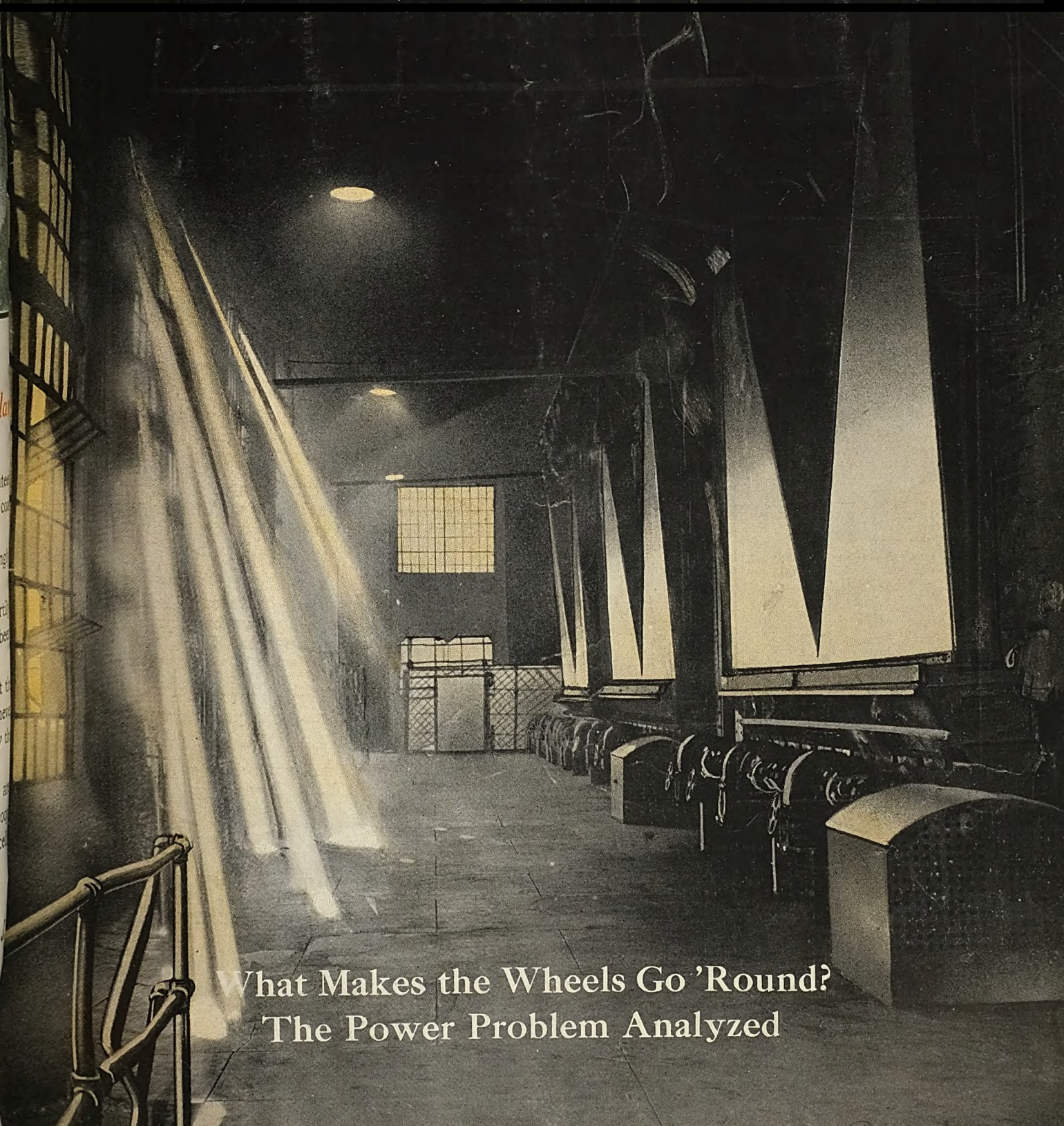
MANAGERS OF MANUFACTURING PLANTS AND BUSINESS ENTERPRISES

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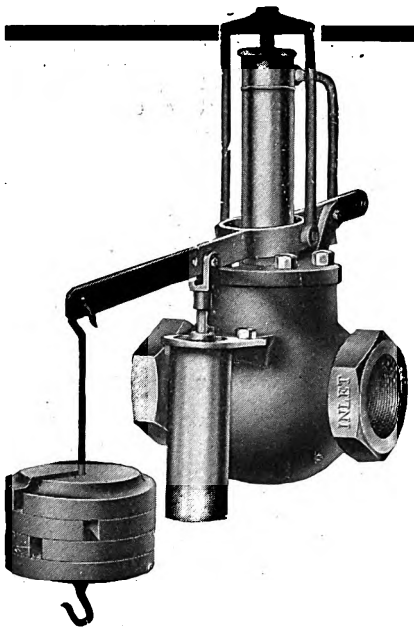
The INDUSTRIAL DIGEST

August 5

25 Cents



What Makes the Wheels Go 'Round?
The Power Problem Analyzed



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THE Davis organization is always looking for improvements—always experimenting.

But—in adopting new principles the Davis organization is always *conservative.*

And this conservative policy has been proved out by almost a half-century of success. Think what that means!

To get the Davis O. K. a principle must be more than sensational, more than what appears to be good; it must have survived the severest practical tests over a telling period.

When you install Davis Valve Specialties you know you are getting tried principles backed by construction and workmanship that has passed the Davis O. K. —a mighty safe guide in buying valve specialties.

Try the Davis Regulator. It has no springs to fail or diaphragms to cause trouble and shorten its life. Utilizing the positive principle of the simple balanced scale, it maintains a constant reduced pressure regardless of fluctuations in the higher pressure. Sizes ½ to 14 inches.

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Or the Davis Float Valve. It has a single seat with a renewable composition disc that makes it close tight, preventing leakage. Sizes ½ to 14 inches.

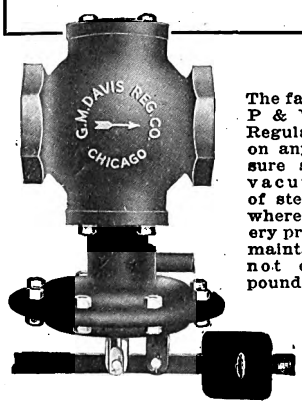
Or the other Davis Valve Specialties listed below, which will be described for you in detail by the G. M. Davis Regulator Co., 409 Milwaukee Ave., Chicago.

Nationally Priced

Davis Pressure Regulator prices are stabilized. You can buy them anywhere at the prices quoted. Order through your dealer or direct from the factory. State whether screwed or flanged ends are wanted and specify initial and delivery pressures. Give information regarding any special condition or service.

The following prices are net, F.O.B. Chicago and apply to both the diaphragm and the piston type.

Size	Price
¾ in.	$22.50
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1¼	27.50
1½	30.00
2	35.00
2½	42.50
3	50.00
4	70.00



The famous Davis P & W Pressure Regulator for use on any low pressure steam or vacuum system of steam heating where the delivery pressure to be maintained does not exceed five pounds.

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STEAM SAVERS SINCE 1875

Water Control Valve
Non-Return Valve
Exhaust Relief Valve
Balanced Valve
Stop and Check Valve
Pump Governor
Emergency Stop Valve
Flow Regulator
Fluid Level Controller
Water Relief Valve
Steam Trap
Pump Stop Valve



—and who wants to waste steam at present prices of coal?

WITH coal costing as high as $13 a ton—and often hard to get at any price—it is far cheaper to put in enough Steam Traps Sarco to stop loss of steam through condensation than to stand the alternative of big waste at the coal pile. Steam Trap Sarco puts the whole question of proper trapping vs. waste of coal on an entirely new basis—

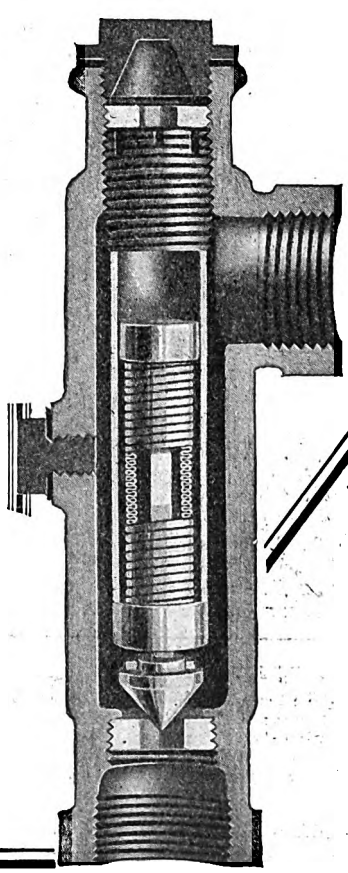
It pays for itself at points where a big trap wouldn't be justified

You can put in *three* Sarcos for the cost of just *one* bucket or floor trap—thus for the same expenditure saving *three times as much steam* and therefore *three times as much coal.*

Because it costs only one-third as much, a Sarco will quickly pay for itself at points where the expense of an old-style trap wouldn't be justified. And after paying for itself, every ounce of steam and every shovelful of coal it saves is all clear gain—for the upkeep is practically zero. No complicated mechanism to get out of order or require constant adjustment and attention. It has only one moving part.

Sarco is more dependable and efficient than old-style traps. It operates automatically—on a simple yet extremely sensitive and responsive system of liquid expansion and contraction. So positive in action that not an ounce of live steam can escape from one year's end to the other.

Drains off all condensate as fast as it forms—and immediately returns it to the hot well—while still *hot,* thus requiring less coal to convert it back into steam. And never any water (condensate) left in the pipes to freeze overnight or over Sunday.



30 Days' Trial

We are ready to let Sarco demonstrate its superiority and economy right in your own plant by sending you one on 30 days' free trial without a cent in advance. If for any reason you aren't satisfied with its performance, if it doesn't prove that it quickly pays for itself through the coal it saves, then you can return it and it won't cost you a cent.

Made in sizes ⅜ in. to 3 in. for any given pressure up to 200 lbs. Booklet No. F-18 and full particulars about our free trial on request.

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STEAM TRAP SARCO

THE INDUSTRIAL DIGEST

A fortnightly digest of the informative articles in one thousand leading industrial magazines covering thirty industries

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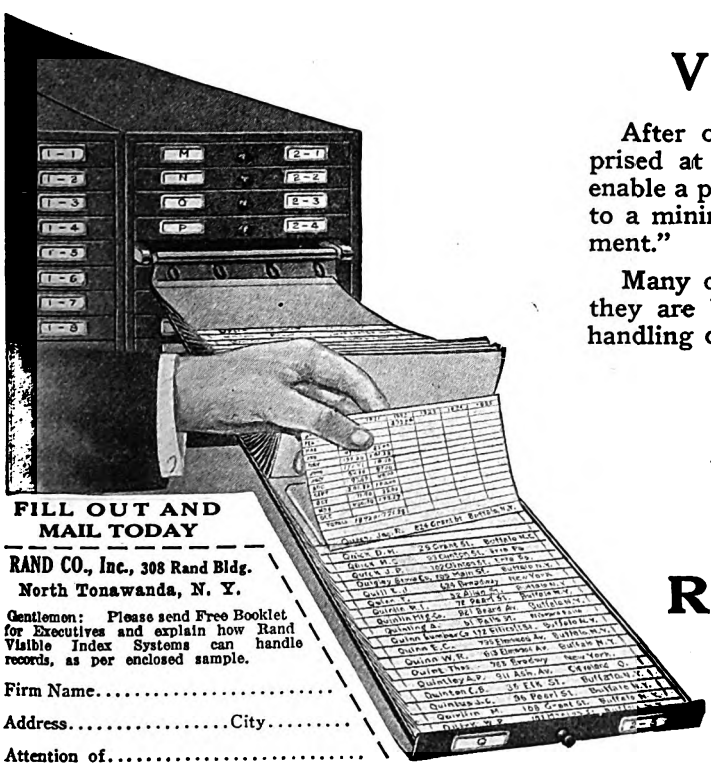


Taking The Question Mark Out Of Business Records

Picturize Business Conditions with Rand Colored Signals



No waiting to search records. A glance shows it all. Multi-colored transparent signals plainly PICTURIZE current conditions peculiar to any business. A composite picture gives a complete summary of your records in surprising detail. Ask for particulars—get the vitally interesting facts.



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RAND CO., Inc., 308 Rand Bldg.
North Tonawanda, N. Y.

Gentlemen: Please send Free Booklet for Executives and explain how Rand Visible Index Systems can handle records, as per enclosed sample.

Firm Name.....

Address.....City.....

Attention of.....

MILLIONS of dollars are annually invested in that little commercial hook—the Question Mark. In almost any office you can hear high-priced executives asking questions, but getting unsatisfactory answers.

What is the reason? ?

Information is incomplete!—the records don't show!!—data is difficult to find!!!—someone is absent and the others "don't know"!!!!

Excuses are legion, but who pays for it all?

A big Eastern Corporation had a tidy sum invested in question marks. Doubt and guesswork had proved expensive. Then they installed—

RAND
Visible Index Systems

After one year the General Manager wrote—"I am surprised at the results realized with Rand. Visible features enable a positive control of stock. Invested capital is reduced to a minimum. Rand Equipment has been a paying investment."

Many of our customers were doubters at the start; today they are boosters because of direct savings effected in the handling of their business records.

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Rand Company, Inc.

308 Rand Building

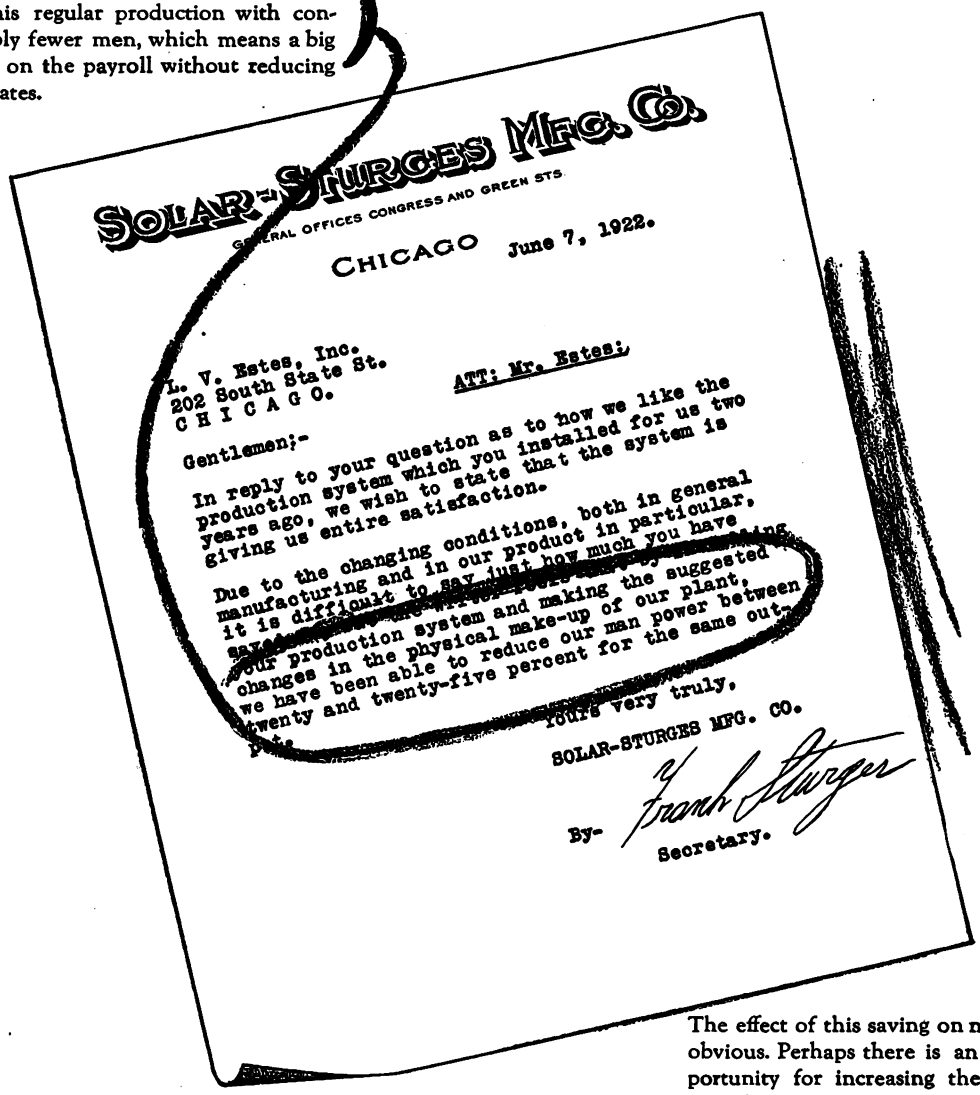
North Tonawanda, N. Y.

Originators and World's Largest Manufacturers of Visible Index Equipment

Cut Labor Costs 20%

Without Cutting Wages

This Chicago manufacturer now maintains his regular production with considerably fewer men, which means a big saving on the payroll without reducing wage rates.



SOLAR-STURGES MFG. CO.

GENERAL OFFICES CONGRESS AND GREEN STS.

CHICAGO June 7, 1922.

L. V. Estes, Inc.
202 South State St.
C H I C A G O.

ATT: Mr. Estes:

Gentlemen:-

In reply to your question as to how we like the production system which you installed for us two years ago, we wish to state that the system is giving us entire satisfaction.

Due to the changing conditions, both in general manufacturing and in our product in particular, it is difficult to say just how much you have saved [illegible] our production system and making the suggested changes in the physical make-up of our plant, we have been able to reduce our man power between twenty and twenty-five percent for the same out-

Yours very truly,

SOLAR-STURGES MFG. CO.

By- Frank Sturges

Secretary.

The effect of this saving on net profits is obvious. Perhaps there is an equal opportunity for increasing the profits of *your business.*

Consultation on Request

A PART OF OUR SERVICE is to send an engineer to your plant to examine conditions that exist and consult with you as to the value of changes that might be made. This service is *without charge or obligation* to you. Just write or phone that you would like to have it.

L. V. ESTES Incorporated

INDUSTRIAL ENGINEERS

202 South State Street **Telephone Harrison 1110**

CHICAGO

Vol. 1
No. 20

THE INDUSTRIAL DIGEST

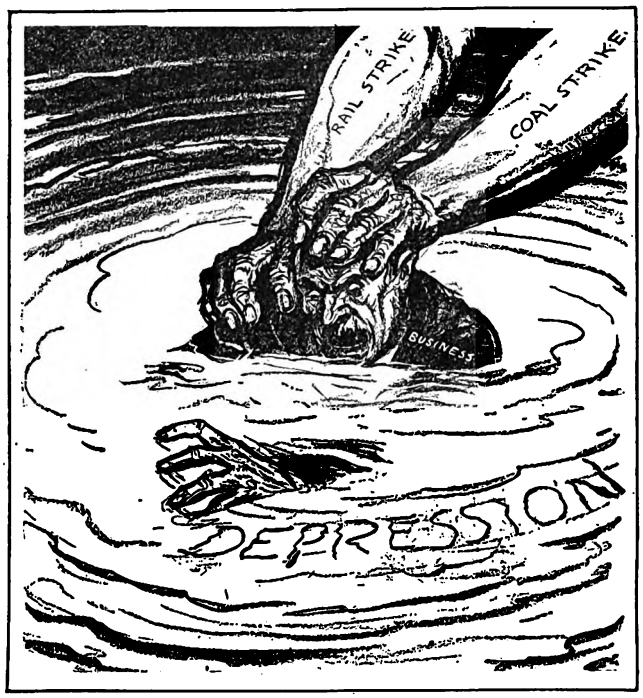
Aug. 5
1922



The Business Weathervane

A Summary of Expert Opinion

The **Brookmire Economic Service** points out that the disturbing factors which have been retarding business developments recently are apt to overshadow the significance found in the favorable aspect of fundamentals, and adds that "First—Easy credit conditions with expanding industrial loans, shown in a rising volume of rediscounts. Second—A rising volume of production in basic commodities, notably iron and steel, lumber, paper and oil, and though steel ingot production declined in June, steel orders registered a notable increase. Production of textiles and coal have been hampered by strikes, but with an early strike settlement in sight, a rising volume of production may be at once expected. Third—As a consequence of rising production a rapid absorption of workers in industry is noted throughout the country. Fourth—Failures are stabilizing and taking on the proportions and normal mortalities from month to month. Fifth—A gradually rising price level in wholesale commodities. Bradstreet's index number showed an advance as of July 1 of 1.7% over June, standing on July 1 at 12.1096. Sixth—A much better crop generally than last year is now likely at prices which cannot but improve the purchasing power of farmers. More active industry will materially increase the buying power of industrial workers. Good railroad earnings will affect favorably the ability to buy of railroad companies. Further, the probability of better returns from industrial investment, through sustained or increased dividends, give promise of generally increased purchasing power this fall."



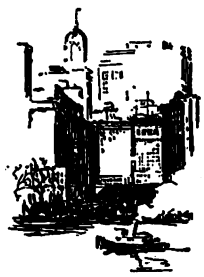
(New York World)

Keeping him under.

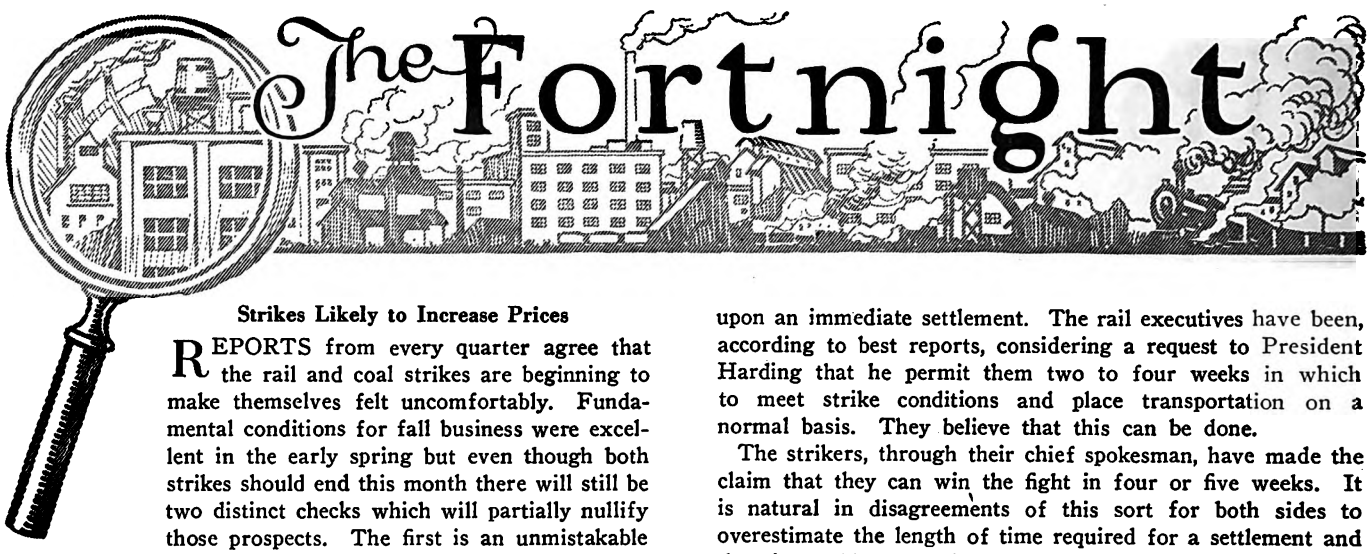
The **United Business Service** points out that the financial aspect for the fall and winter is very favorable on account of the following items: "1. The reduction of money rates to normal levels. 2. An advance of 12 points in the average of 40 bonds. 3. An advance of about 20 points in the average of 50 stocks. 4. Hundreds of millions given to industry through new financing. 5. Banks in strongest position in history. On the mercantile and industrial side inventories have been readjusted, surplus stocks reduced in all lines, unsound enterprises weeded out, costs of production reduced and wages readjusted. Railroad and industrial earnings have risen, business confidence has been restored, and commodity prices have risen about two-thirds the distance ordinarily covered in pre-war cycles."

The Magazine of Wall Street believes that industrial corporations, including public utilities and railroads, may expect a constantly improving financial condition due to the following factors: "1. Liquidation of high-priced inventories. 2. Reduction of bank loans. 3. Lowering of interest rates. 4. Lower cost of materials. 5. Increased efficiency of labor. 6. Greater stability of markets. The combination of the above factors in connection with the larger amount of incoming business has contrived to lower the per unit cost. Reduction of overhead expenses accomplished in this way is responsible for the improvements in earning-power."

Forbes Magazine agrees with other leaders of economic thought that "the spirit of enterprise is distinctly reviving. Forceful entrepreneurs have regained confidence in the outlook. What is equally important, they can also obtain very readily and on reasonable terms all the capital necessary for whatever plans and projects they have in mind. Bankers everywhere are seeking out safe borrowers and trying to induce them to borrow substantial amounts. And as the general opinion is that we have now reached a reasonable price level as well as a reasonable wage level, it is coming to be felt that the time is about ripe for branching out, at least in the home market."



Dun's says that the general rate of business is slower.



Strikes Likely to Increase Prices

REPORTS from every quarter agree that the rail and coal strikes are beginning to make themselves felt uncomfortably. Fundamental conditions for fall business were excellent in the early spring but even though both strikes should end this month there will still be two distinct checks which will partially nullify those prospects. The first is an unmistakable fuel shortage and the second is the probability of the worst traffic tieup with which this country has ever been faced.

In addition, if the coal and rail strikes are not settled promptly there is every possibility of an increase in unemployment, a shortage of commodities and a sharp rise in prices.

The loss of production and of distribution occasioned by any strike can never be recovered. An excellent example is the recent situation in Russia where for a time the entire population quit work. Even there, however, prices mounted so rapidly that the few concerns that succeeded in selling commodities which they had on hand were made very wealthy in terms of money. The tendency is the same in every strike. The more people involved in the strike and the longer its duration, the greater is the tendency toward an increase in commodity prices. Conditions were favorable to such a price increase in the early part of the year and with the bituminous coal miners out for four months and the railway shopmen out for one month there can hardly be any question that commodity prices will show an advance this fall and winter. The longer the strike the greater will be the advance.

This fact is of tremendous importance to everyone in business. In the first place such an advance will, if carried to any lengths, make necessary a readjustment in wages which up to this time have been steadily dropping in every industry. In the second place it will have a direct effect on retail sales and indirectly a great influence on production. Consequently it is important to estimate as closely as possible when the strikes will end.

How Long Will They Last?

THE prospects of terminating the rail strike (which is treated at some length in the following pages) may be considered fairly good when the following facts are taken into consideration. The Government is apparently insistent upon an immediate settlement. The rail executives have been, according to best reports, considering a request to President Harding that he permit them two to four weeks in which to meet strike conditions and place transportation on a normal basis. They believe that this can be done.

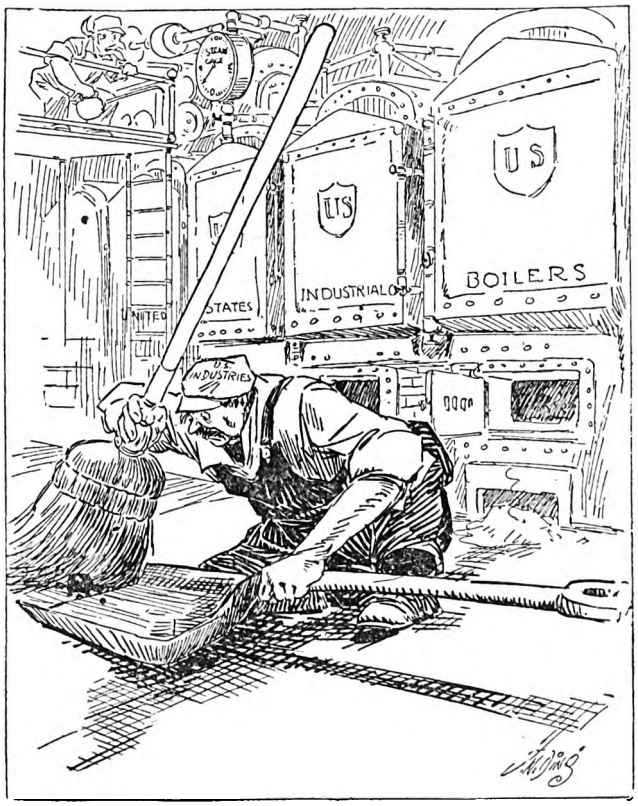
The strikers, through their chief spokesman, have made the claim that they can win the fight in four or five weeks. It is natural in disagreements of this sort for both sides to overestimate the length of time required for a settlement and thus it would seem fairly probable that within the next two or three weeks, or possibly a great deal sooner, the rail strike will have been terminated. The seniority point seems to be the only one which is still in dispute and some compromise will not doubt be effected on this score.

Coal Strike Still Deadlocked

WHEN the coal strike is considered prospects of an immediate conclusion are not so good, however. First of all there seems to be a general agreement among Administration officials to settle the rail strike first, on the theory that even were the coal miners back at work the roads could not handle any more fuel at the present time. In the second place the miners show no signs of a desire to return to work and their ranks are holding firm to a remarkable extent. Perhaps never before has union solidarity been so well exemplified, as in the present mine strike. If the purpose of the operators was to break up the United Mine Workers they have probably failed.

In the third place public opinion is not yet thoroughly awakened to the seriousness of the situation. It is a curious fact that an anthracite shortage will cause public interest to awaken very quickly whereas the much more important effects of a bituminous shortage fail to create any great demand for a settlement for a long time. The public will have to see factories shut down and feel the pinch of reduced payrolls before any general clamor will be made for a settlement.

In the fourth place there does not seem to be any inclination on the operators' part to concede anything whatsoever. Should the strike be settled at present it would mean a defeat for the operators with the miners returning to work on a more favorable wage basis than was originally anticipated. The operators have apparently determined to "fight it out on this line if it takes all summer" and unless the Government



(St. Louis Globe-Democrat)

A last lump to feed the hungry boilers.

in Perspective

steps in it will probably take all summer and most of the fall.

The creation of a Federal commission with control over the production of coal or control over conditions governing the production of coal seems to be but a matter of time. The President has advised Senator Borah that he would back any legislation which would prevent a recurrence of the present situation. The two factors in government control will probably be the creation of a wage board after the character of the Railway Labor Board and some method of price control based in all probability upon the Hoover method of interstate control with individual State responsibility.

The priority orders in transportation which went into effect on July 25 have already affected unfavorably those industries which were placed far down on the list. One of the unfortunate features in this respect is the fact that orders to many mills are being cancelled on account of inability to meet delivery dates.

Crops Promise Well

THE crop situation has been greatly improved recently by favorable weather. At the present time prospects are good for the current yield in cotton and in most of the cereals. The financial condition of our farmers was greatly improved by the higher prices obtained for the last of the 1921 yield. They were able to greatly reduce indebtedness at the banks and to pay for fertilizer and equipment with which to improve 1922 results. Yet with the incoming crops larger than had been expected it will be difficult to maintain present prices unless Europe is a large buyer. The demand from abroad will certainly be less than normal and possibly not enough to take up our surplus. Thus the favorable effect of a good crop may be to some extent offset by a softening in price.

The Peak Reached in Certain Industries

THE business recovery has been most complete in the automobile and building industries and apparently in these two lines the peak has been reached. The oil industry is feeling the result of large stocks on hand and there have been recent cuts in the price of petroleum products. The steel industry is showing a steady improvement hampered only by the recent coal situation. It is not generally believed that the interference will be of long duration or that it will have serious consequences to the steel industry.

Cartoonists Would Reconcile Us to Government Operation



(Kansas City Star)

It can be worn again, if necessary.

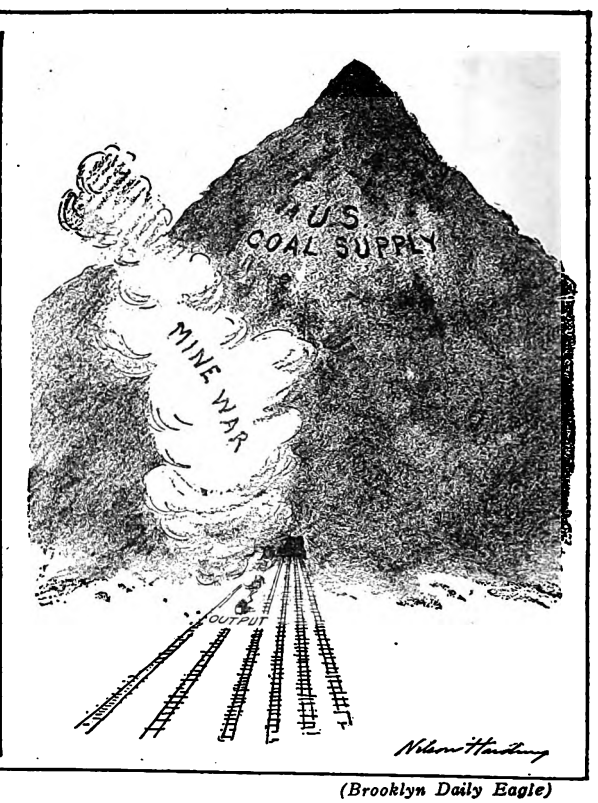
(Brooklyn Daily Eagle)

Any idea of fire prevention?



(New York World)

Line up for rations.



(Brooklyn Daily Eagle)

The mountain and the mouse.

A Month of the Rail Strike

ON July 1, 400,000 shopmen left their jobs in protest against the $60,000,000 wage cut ordered by the Railway Labor Board. For a time it appeared likely that the same number of maintenance-of-way employees would also strike but the agreement of the Labor Board to arbitrate their wages prevented the walkout. The shopmen have demanded that the wage reduction be set aside, that rules affecting overtime pay should be modified and that the practice of "farming out" repair work should be entirely abolished. President Harding's attempt to settle the strike have up to this writing proved unsuccessful, although an early termination is hoped for by the Administration. The railroad executives have made strenuous efforts to keep traffic moving and have been successful in many cases. For example, the New York Central system recently made a public statement with figures of car loadings showing a steady improvement in operations. The Pennsylvania system also reported a continued improvement throughout the entire road and gave figures showing the daily increase in the numbers of shopmen returning to work.

In order to keep freight shipments moving the railroads have had to promise permanent jobs to the new men that are being hired. This of course will force the railroads to retain the new men in place of the shopmen who walked out and consequently the strikers have forfeited all seniority rights. The Administration hopes to have the railroads modify their decision on seniority, but practically all executives to date have strongly insisted that the men forfeited all such rights when they left the road and that it would be difficult if not impossible in case of future strikes to secure men outside if the railroad's promise to the men hired in this instance were broken.

In fact there has been a statement made that many of the executives and officials of the roads would themselves go on strike by resigning their positions if the strikers were taken back with seniority intact. This would effectively prevent the roads from making any compromise, if the report proves true.

The shopmen still believe that they can win the strike in spite of the fact that there has been thus far no vital delay in transportation. The action of the Interstate Commerce Commission in re-establishing priority ruling on essential commodities has gone a long way toward saving the situation.

At the present time the strike is confined to a relatively small fraction of the total railroad employees. It can hardly succeed without the support of the rest of the employees and of the general public. Public support, the strike is hardly likely to get, since practically everyone outside of the unions has suffered more from the business readjustments of the last year than those inside.

The brotherhoods of the engineers, firemen, conductors and trainmen are none too anxious to fight the shopmen's battle for them. The brotherhoods did not benefit as much from the dictatorship of labor during the post-war boom as did the other unions. Since they did not receive unusually high advances they are not so likely to be forced to accept a wage cut under present conditions, and thus there is no great incentive for them to back up the strikers. A consensus of opinion seems to be that the strike leaders have recognized that a mistake was made in calling the strike and that they are willing to accept the offer of arbitration proposed by President Harding if it will give them a chance to save their faces.

If the railroad executives can secure a return of the men at an early date on the basis of the wage scale announced by the Labor Board it is probable that they will effect some sort of a compromise on the seniority ruling, since this is by no means the important point at issue.

With both sides fundamentally ready to end the struggle it would seem to be merely a matter of days before the men are back at work.

Coal Reserves Steadily Dwindling

THE coal strike shows few signs of coming to an end. The fundamental differences between the miners and operators indicate that there is still a long fight ahead. There is already a very serious shortage of fuel west of the Mississippi, especially in the Northwest. Reserves in New England are steadily dwindling and the seriousness of the situation can hardly be exaggerated. A curtailment of rail and industrial operations from lack of coal is imminent.

It is hardly possible to get enough fuel into the Northwest by water to take care of the requirements through winter and consequently traffic on the roads running West from the coal mining regions will be overloaded this fall and winter. On July 25, the Interstate Commerce Commission issued priority orders similar to those in effect during the war. Railroads and steamship lines are entitled to first supplies and public utilities come second on the list. The priority arrangement is necessary to make fuel distribution as effective as possible during the slowing up of transportation due to the shopmen's strike but it will doubtless be continued even if the rail strike is settled until conditions resume at least a semblance of normal.

The Administration apparently planned to let the strike go as far as possible before interfering in the hope that the operators could produce enough coal to carry the country through the fall and winter. Even with the elaborate program for the importation of foreign coal this seems impossible and the situation therefore resolves itself into one of devising some means of getting the miners back to work. The President's invitation to the operators to open their mines has had practically no effect on the anthracite production and little on the bituminous situation. The production of bituminous is still under 4,000,000 tons a week. According to the geological survey our consumption is approximately 8,000,000 tons a week. Importation is on a very small scale and could not possibly hope to make up the balance.

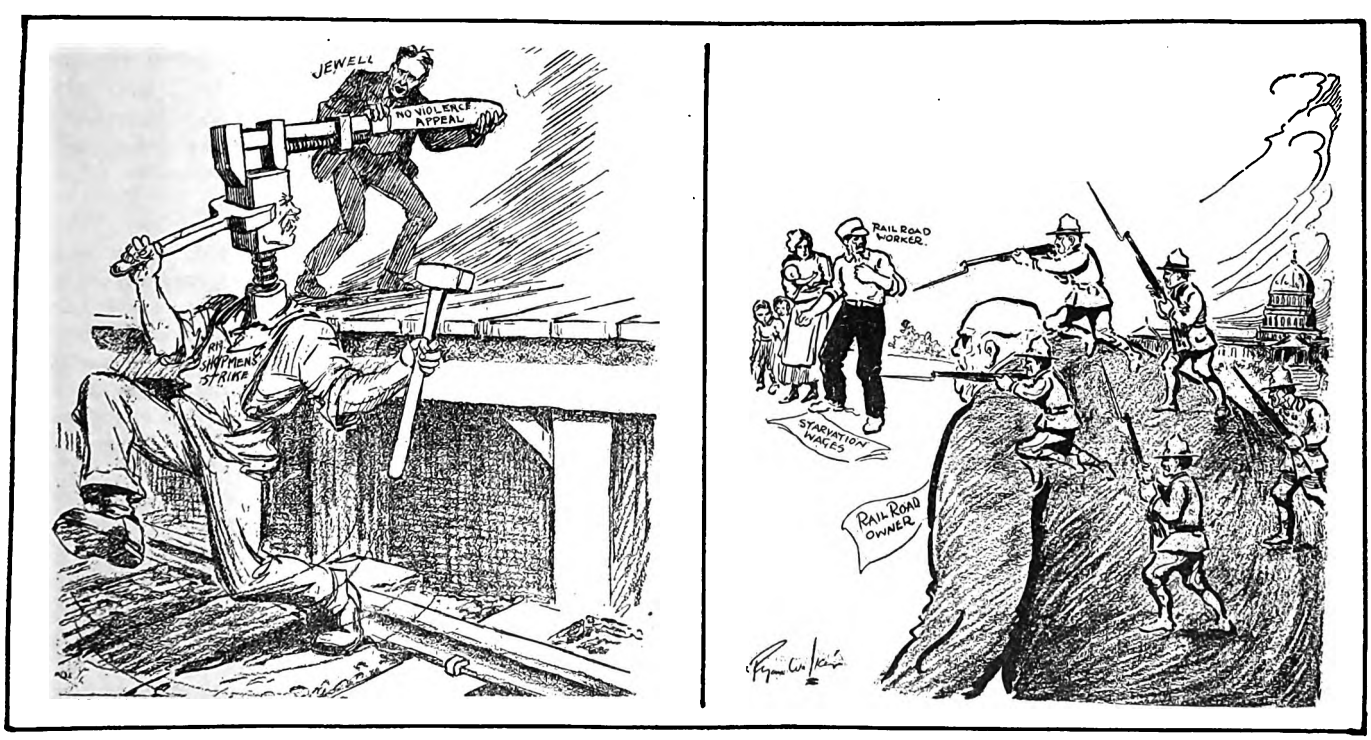
Some of the miners originally felt that inasmuch as they were forced to remain idle a certain portion of the year in any event, they might take that term of idleness during a strike as well as at any other time. But they have begun to feel the financial effects of a long period of enforced idleness. It is reported that suffering in the Pennsylvania, West Virginia, and Illinois fields has been becoming more acute each day.

Since indications point to an early settlement of the rail strike Administration efforts are now being focused in this direction. It is anticipated that within the next week or 10 days, the rail strike will be settled and attention will be directed entirely to the coal situation. The present plan seems to be the appointment of a coal commission with powers equal to the Interstate Commerce Commission in the fuel field or the giving of plenary powers to the latter commission to deal with coal in accordance with the emergency. Unless something unexpected turns up, there does not seem to be much hope for a settlement of the coal strike before the first of September. By that time we will be facing a severe famine and unless the strike is settled shortly after that date we will probably be faced with the necessity of shutting down some of our industrial plants.

The priority orders have made it difficult for manufacturers in those industries not favored by the ruling, to estimate their production in advance. If coal rationing is to be continued for any length of time, it is certain to result in the cancellation of many orders of goods for future delivery. Particularly is this true in case of those factories now at work on orders for Christmas and holiday articles.

Another month will see these industries represented at Washington by manufacturers insisting on a modification of the priority orders under the plea that they must have coal, and in reasonable quantities, if they are to remain in business.

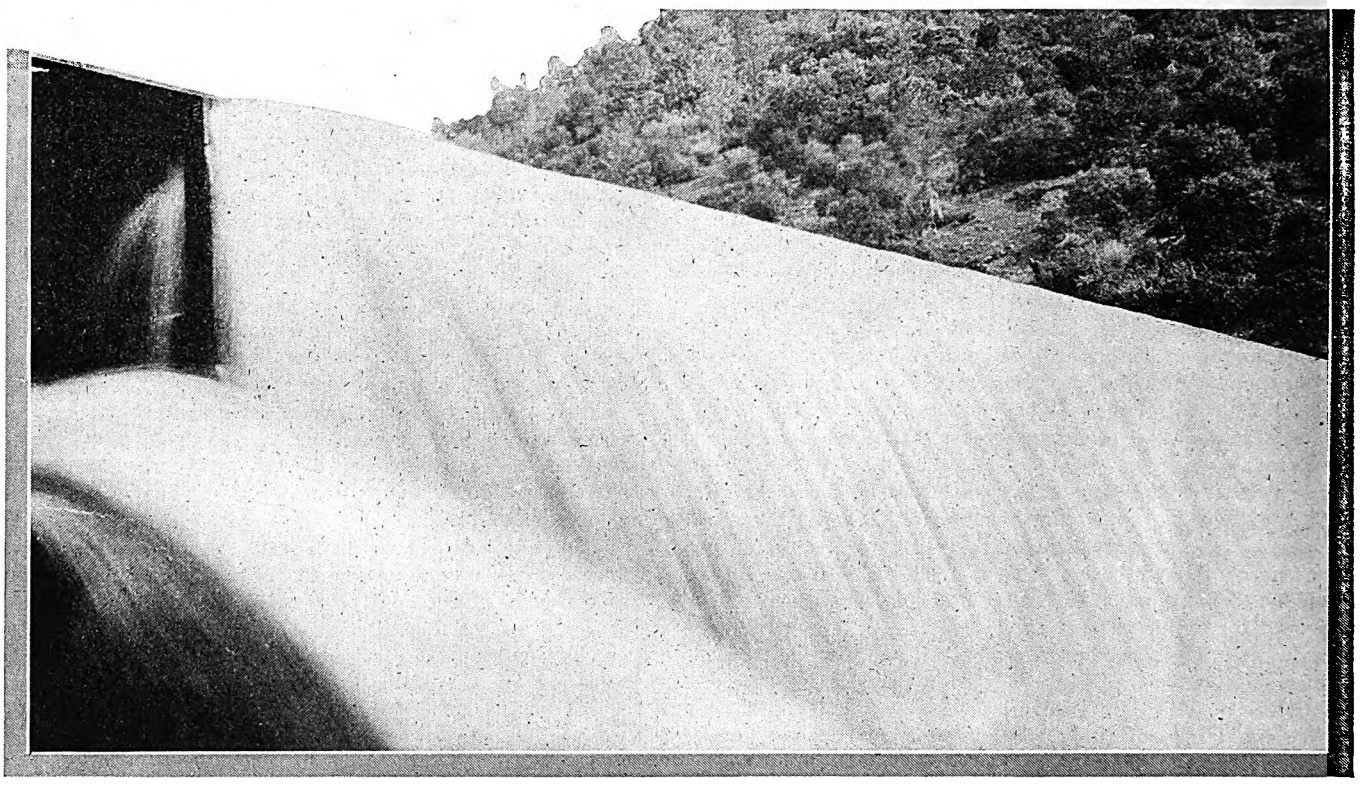
Intervention Never Seems the Same to Both Sides



(Newark Evening News)
Keeping his head.

(New York Call)
A protected industry.

What Makes the Wheels Go 'Round? The Power Problem Analyzed



WHAT will happen if the coal strike continues? How long is it likely to last? What are our fuel resources? How soon will they be exhausted? Is the trend of power generation toward hydro-electric plants or is steam being used more than ever? How large a part does fuel oil play in our industrial life? What is the most efficient method of producing power from coal?

These are some of the questions which are answered in this issue, in a searching analysis of our coal, oil, gas and water power resources.

Knowledge of fundamental factors in our power problem is more important today than ever before. THE INDUSTRIAL DIGEST presents this analysis in the hope that it may serve to clarify some of the elements which are under constant discussion in these days.—*The Editor.*

POWER is the lifeblood of industry. Without power our factories could not run, our workers could not draw pay envelopes and consumers could not purchase manufactured goods. So it is that a crisis in power affects everyone intimately.

The country is facing a power crisis at present. During the last four months, most of the nation's coal mines have been idle—and coal, practically speaking, is power. Even should the coal strike stop today, which does not seem likely at this writing, it is certain that there will be a fuel famine in the fall.

Some coal is being mined, and of course we are not threatened with the loss of our entire power supply, yet the imminent exhausting of our coal reserves means that when manufacturers wish to start ahead full speed in the fall, they are likely to be held up. Coal will probably cost more than if there had been no strike, and consequently goods will cost more. Business will not be so good as it would otherwise have been. People will have less to eat, to wear, to spend. . . . All because of the partial failure of the power supply upon which the structure of our entire modern civilization is built.

It is important, therefore, to examine carefully into our power resources; the means by which they are developed, and the probable effect of their future development upon industry as a whole and individual plants in particular. Such an analysis cannot but be helpful in presenting a clearer picture of the situation, and consequently a better understanding of the probable developments from the standpoint of the manufacturer.

The chief source of the energy upon which industry depends is, of course, coal. Second in importance is waterpower, and in addition we have petroleum and natural gas. From one point of view petroleum might be considered more important than waterpower, for at present it is more widely used; but it is chiefly used for power in the form of gasoline for non-industrial or semi-industrial purposes. From the viewpoint of our future development, moreover, waterpower is of tremendous importance and is receiving a measure of the attention to which it is entitled.

The energy resources per capita possessed by the people

of the United States, according to C. G. Gilbert and J. E. Pogue in *America's Power Resources*, are as follows:

	Produced Annually	Used to Date	Unused
Coal	6.5 tons	141 tons	35.000 tons
Petroleum	4.4 barrels	54 barrels	59 barrels
Natural Gas.....	Equivalent of 0.3 ton coal	Impossible to estimate	Impossible to estimate
Waterpower	Equivalent of 0.4 ton coal	Impossible to estimate	Equivalent of 3.6 to 12 tons coal per year

Dr. George Otis Smith, director of the U. S. Geological Survey, expresses as follows the amount of power used by American industry:

"For contrast with the present era of machine-aided civilization we naturally turn to the days of ancient Rome or Greece or Egypt, when hordes of slaves toiled both in the erection of those great monuments that have been called the "wonders of the world" and the performance of the daily tasks of providing the necessities and luxuries of that age. Man power then made use of only the simplest laws of mechanics.

"I find that several writers on the subject of power have estimated the number of energy servants in our employ, and these estimates are based upon the installed capacity of our prime movers, which is approximately 100 million horsepower, or nearly one horsepower to each man, woman, and child, in the United States. Using the equivalent of ten man-power hours to the horsepower-hour we find in this the suggestion that we each have the equivalent of ten servants to do our bidding. But even mechanical power has some of the frailties of human power: capacity and performance are rarely equal. So, if we take the statistics of the energy output that we really utilize we discover that these energy servants work very short days, for, with the exception of the electric utilities, our prime movers do not give us anything like the equivalent of an 8-hour day in terms of their rated capacity. The steam locomotives, which represent perhaps 60% of the total installed capacity, average only about a 7% used factor, which brings down the average load factor to not much over 14%.

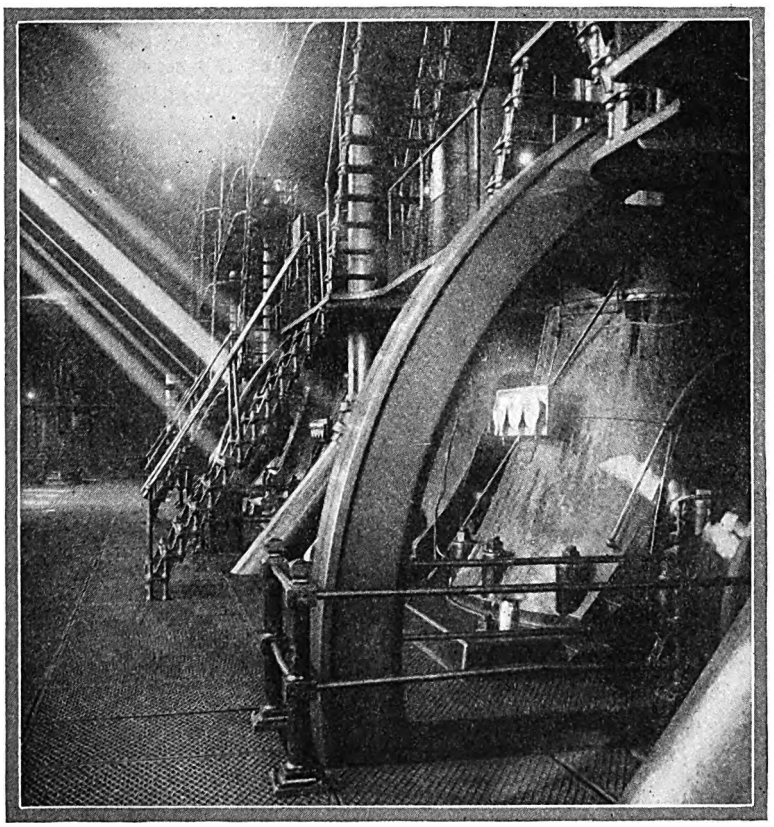
"These workers, represented by the water turbine and the steam engine, are tireless, it is true, and they are able to render continuous service as man power cannot, yet the fact is that we do not so use them. We may figure that we each have ten energy servants to help us in the world's work, but as they average only about 23½ hours a week a better statement would be that *we each of us have the equivalent of five slaves working for us day by day.* You will note that this estimate is arrived at by figuring that with a 14% load factor it takes nearly two installed horsepower to equal one continuous horsepower for the human week of 44 hours. This quota of five energy servants for each of us is far in excess of what the Greeks possessed in the form of human slaves, five helots being, I understand, the power equipment of the average Greek freedman's family, or nearer one apiece, when Greek culture rested on a substratum of slave labor."

Comparing the extent of our resources in coal, waterpower and oil, the three chief sources of power, Dr. Smith says:

"If we take 50,000,000 horsepower as an average figure for the potential waterpower of the United States, without storage, we find that if fully developed and if used at the average load factor of today our rivers and streams would just about meet the country's present needs and would supply that amount of power for all time; moreover, with storage and an improved load factor they could provide a considerably increased output of energy to meet the growing demand.

"Now if, leaving our waterpower resources to one side, we try putting the whole power burden on our coal mines we are able to make a direct comparison between our coal resources and our potential waterpowers. There is in the United States accessible and available for future use an aggregate of about 2500 billion tons of coal, not including lignite. Only about one-fifth of this is in the Eastern States, another fifth is in the coal fields of the Central States, and nearly three-fifths is in the coal fields of the Central States, and nearly three-fifths is in the Rocky Mountain and Western States. In converting these great reserves of coal into power I found myself using a new unit, the horsepower-century, for which the equivalent in Eastern coal is 250 tons, in interior coal 300 tons, and in Western coal 350 tons. By applying these factors to our estimates of reserves we get 2240 million horsepower-centuries, 1750 million horsepower-centuries, and 4171 million horsepower-centuries, respectively, or a total of 8161 million horsepower-centuries. I should add that a million horsepower-centuries is seven times the present power output of the United States. So you will see that by adopting the best steam practice of today the present power requirements of this country could be met with coal for 57,000 years, although we know that long before the end of that period the greater depth of the coal mines and their increased distance from market would alone create power demands for mining and transportation that would considerably cut down the amount of power available for other uses.

"We measure the petroleum wealth of the United States by billions of barrels—about 5 billion already produced in the last 60 years, and about 7 billion left for the future. Again adopting the best steam practice of today in public-utility stations of Texas and California—a little less than 32 barrels to the horsepower-year—and trying to carry the whole power load of the country with oil alone, we find that the oil reserves of the United States, although measured by billions of barrels, would last only 9 years and 3 months. Without allowing for the fact that steam raising for power is only one of the many uses of coal, these two figures, 57,000 and 9¼ years, are sufficiently impressive to make us fairly receptive to the general truth of the statement: We have just as much real chance of replacing coal by oil as we have of finding enough gold to use it in place of steel."

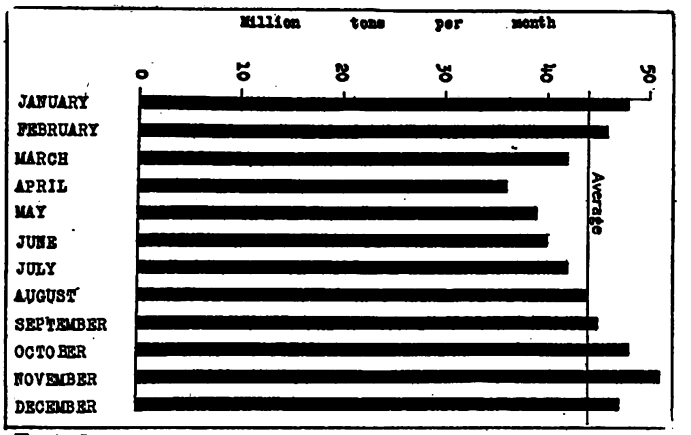


The engine-room of a modern, steam-driven factory

Coal, then, is the primary source of our industrial power. It will probably remain in this position for many years. The increased use of oil as fuel and the development of waterpower will supplement coal, but can hardly replace it.

The United States consumes something like two-thirds of a billion tons of coal a year. Charles P. Steinmetz made possible the comprehension of this enormous figure by making this comparison:

"One of the great wonders of the world is the Chinese Wall, running across the country for hundreds of miles, by means of which China unsuccessfully tried to protect its northern frontier against invasion. Using the coal produced in one year as building material, we could with



Typical transportation demand of the soft coal industry. When business is fairly active, our annual requirements for home consumption and export are about 528,000,000 tons per year. The diagram shows the monthly quotas in which this total is likely to be called for by the consumer, as indicated by the experience of the past eight years.—*(Survey Graphic.)*

it build a wall like the Chinese Wall, all around the United States, following the Canadian and Mexican frontiers, the Atlantic, Gulf and Pacific Coast; and with the chemical energy contained in the next year's coal production we could lift this entire wall into space, 200 miles high. Or, with the coal produced in one year used as building material, we could build 400 pyramids, larger than the largest pyramid of Egypt."

There is coal in the ground under nearly 500,000 square miles of the United States. Most of that which is mined, however, comes from a few regions where the deposits are high grade and which are situated in economically strategic positions. Nearly all the anthracite mined comes from an area about 500 miles square in northeastern Pennsylvania. The important bituminous areas are the Appalachian field, which runs from Pennsylvania to Alabama and supplies the iron and steel industries and the great manufacturing centers of the East; a field in the interior extending from Michigan to Texas, whose coal, for the most part, is not nearly as high grade as that of the Appalachian field and which has been worked chiefly in Illinois; and the fields of the great plains and the Rocky Mountains, whose coal is almost all low grade, with a few deposits of high grade that are now being worked. About a quarter of the coal mined so far has come from the Appalachian field, a fifth from the Michigan-Texas region, and not quite one-tenth from the field further west.

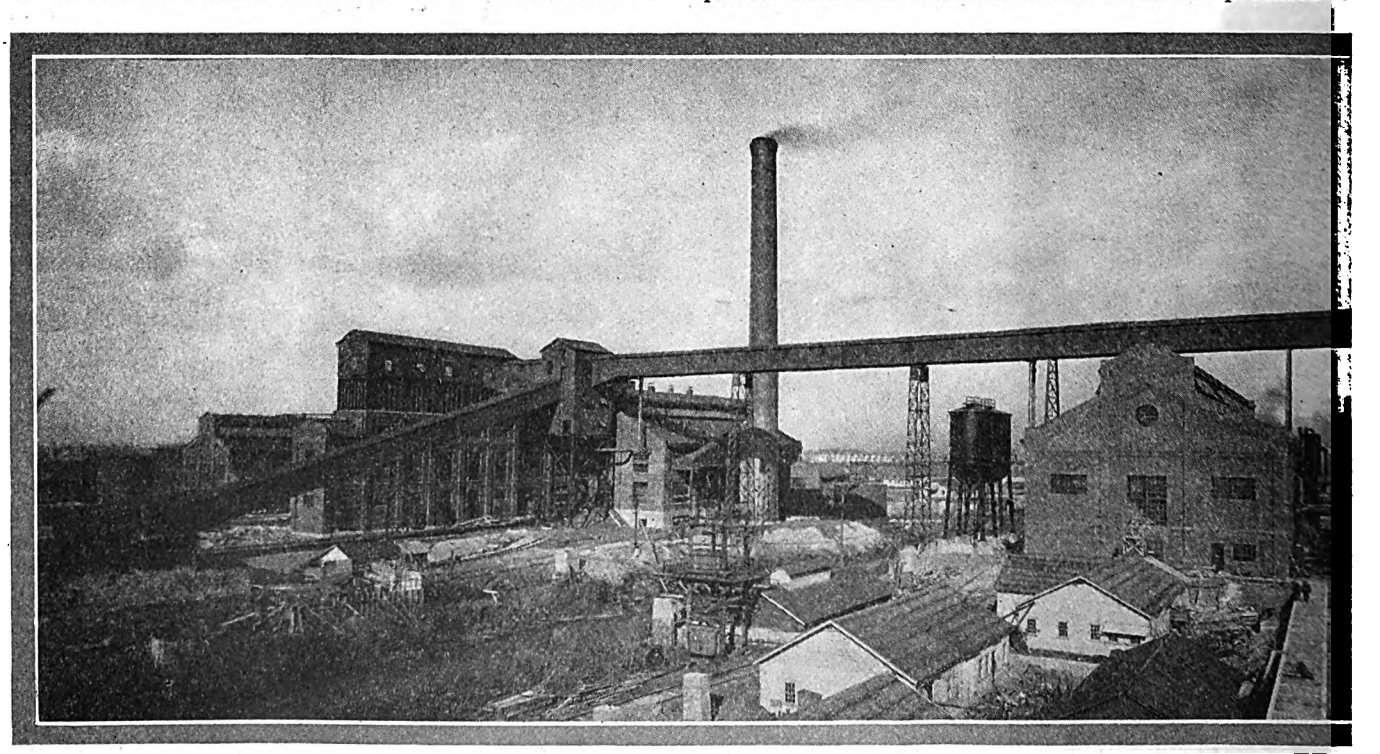
The Trouble with Coal Mining

IF coal of all grades is considered, the supply underground is almost unlimited. Less than one-half of one per cent. of our total reserves have been touched. But in view of our present industrial practice the important question is not: "How long will our total coal reserves last?" but "How long can we continue to dig the kind of coal we're getting now and burn it in the way we are now using it?" The answer to the latter question has been given by M. R. Campbell, of the United States Geological Survey, who says: "Before long, perhaps within 50 years, much of the high-rank coal in the United States will be exhausted."

We are now being shown, to our pain, that there are many things the matter with the methods we use in mining this coal of ours. The periodic disorders which frighten the country, and often, as in the present case, really menace chances of prosperity, are evidence that the industry is not organized as it should be. Gilbert and Pogue sum up the difficulties with the coal industry as follows:

"Bituminous coal mining as an industry is beset by conditions which are the occasion of present wastefulness and the justification of apprehension for the future. Scattered and unorganized, most of the individual companies are small and financially weak; inadequate cooperation in engineering practice exists; new technical developments are slow of growth; coal is mined for the most part by obsolescent, long-established methods. With no means of storage developed, the average mine can produce coal only when railway cars stand ready to receive it; a fluctuating demand, accentuated by seasonal variations, leads to instability of operations; many mines must close down in slack months, with destructive effect on the conditions and supply of labor. The supply of labor also is not equal to the capacity of the developed mines; hence a labor shortage always develops in periods of prosperity, when the demand for coal suddenly increases.

"For years, until recently, the price of coal at the mine ranged from $1 to $1.15 a ton, a figure so low that only the best and most easily obtainable coal could be extracted by the cheapest method of mining, irrespective of the waste involved. The tonnage of thin-seam and high-cost areas sacrificed in the process amounts to more than half the total coal produced to



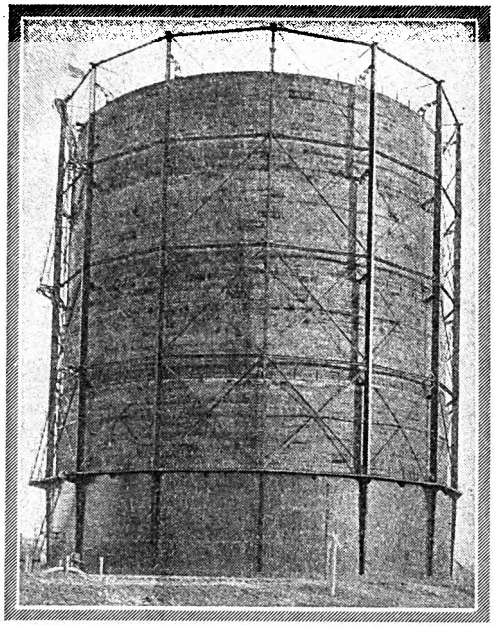
General view of the Chicago By-product Coke Co. plant, designed

date. Many districts have been burdened with a leasing system that obligated the company to remove a given tonnage each year, irrespective of market demand or price, with the result that the richest portions were drawn from seam after seam with irretrievable loss to present needs. The fixing of wages on the basis of thick and easily worked seams has imposed severe penalties upon inferior conditions, precluding the introduction of new and improved methods. Added to this, the policy of the Government, as exemplified in its anti-trust laws, has forbidden combinations and restrained co-operation, with the result that large-scale, standardized operations, a paramount and distinctive American achievement, are virtually lacking in the mining of coal.

"The trouble with coal-mining is too much competition, resulting in a lack of balance between production, transportation, and distribution. Coal-bearing land is so abundant in the United States that an excessive number of mines have been developed. The productive capacity of the coal industry, in consequence, is far in excess of the requirements of the country. In addition, the demand for coal varies so from summer to winter that for the past 30 years the average working year has been only 215 days in length, leaving 93 possible working days when the mines were idle. Fluctuating operations have also created problems in the allocation of coal-cars, with enforced idleness in summer and congestion in winter. In times of slack demand, labor and equipment in large volume are forced out of employment. Depressed periods, in turn, are invariably followed by a hysterical demand and frenzied competition on the part of consumers, who are apt to place orders far in excess of their requirements. The coal industry is unstable, speculative, and unreliable alike to producer and consumer. The crying need is for stabilization. With proper operation, an excess mine capacity of some 150,000,000 to 200,000,000 tons and an excess labor force of some 150,000 men could be eliminated."

The problem of the transportation of coal is the most difficult which arises in connection with the fuel supply. Power at the mine is of no use to anyone; it must be carried to the factory where it is to be used. At present this job is done by the railroads, one-third of whose freight is coal. This is a tremendous burden for our badly strained railroad system, which at best is inflexible and troublesome. This situation is complicated by the facts that the railroads themselves use a large proportion of the coal they carry, and the capital which controls the roads often overlaps with that which controls the coal mines. This will make more difficult a scientific revision of our method of supplying coal-derived power to industry.

But as the power situation grows worse, as it will if it follows its present trend, something will have to be done.



(Gas Age-Record)

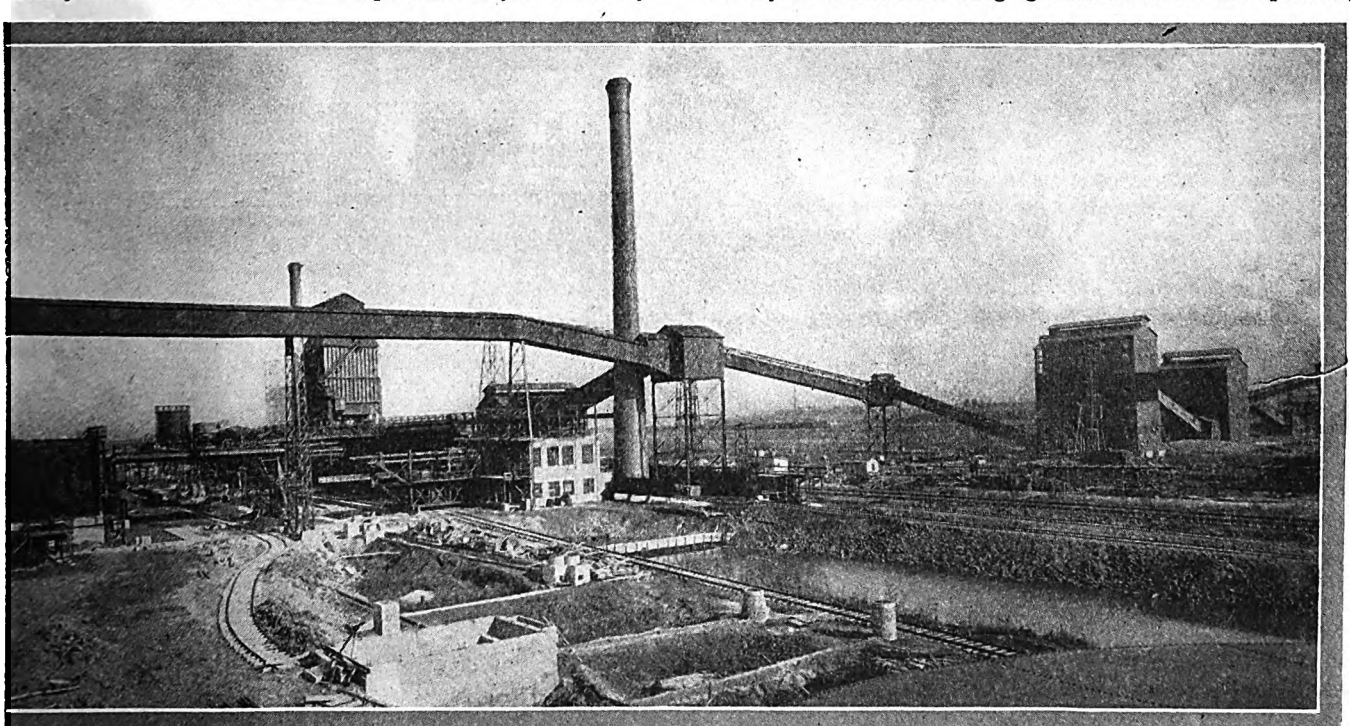
A typical gas tank with 2,000,000 cu. ft. capacity.

The Remedy

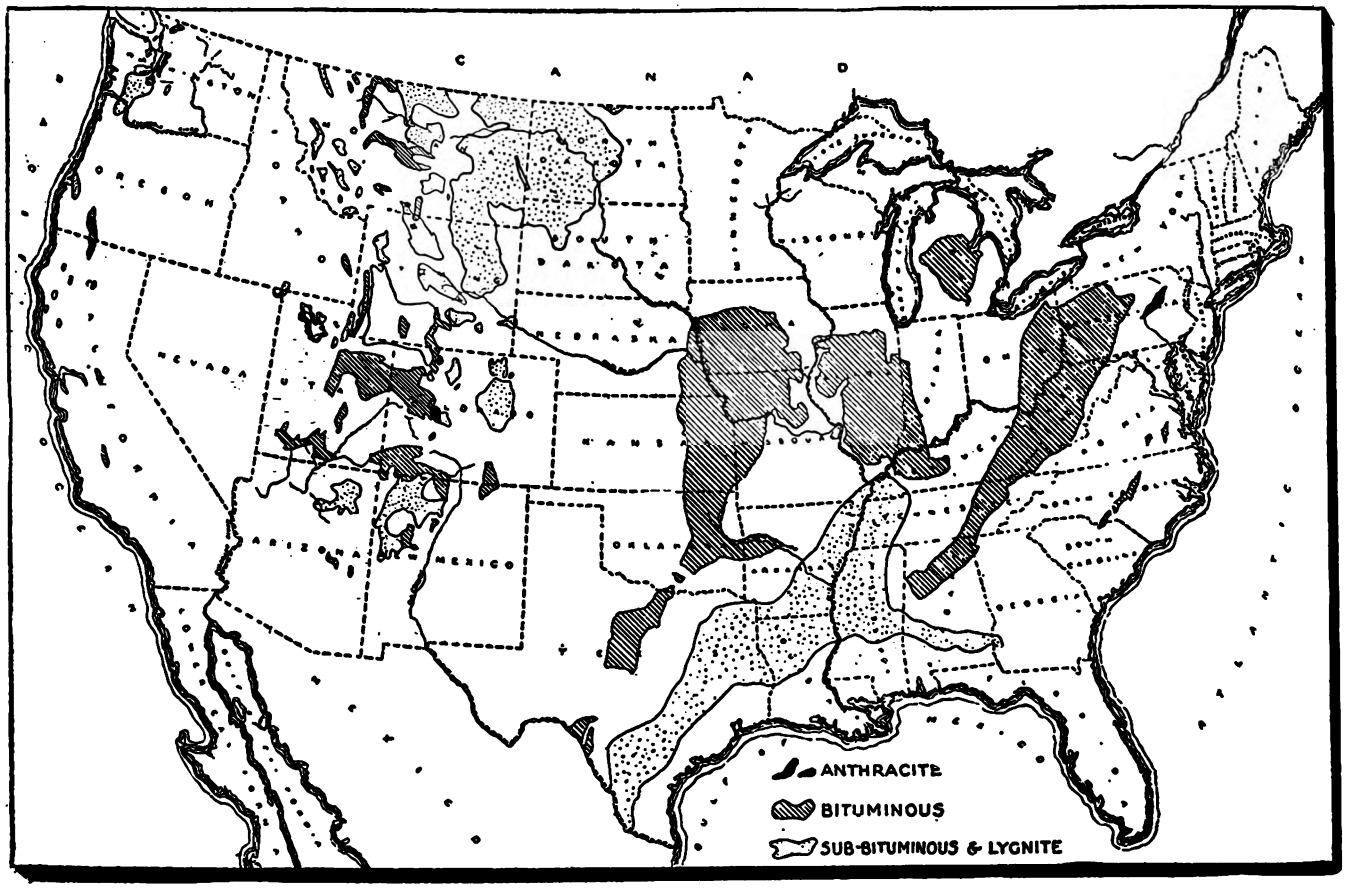
THE most obvious remedy is the reorganization of the coal mining intry from a business point of view, in such a way that the unevenness of production and the labor troubles will be ironed out. It is quite conceivable that the present crises will force an attempt to find a solution along these lines.

In the long run, however, the problem will have to be approached from a far more profound point of view. If our supply of high-grade coal is sufficient to last us for only 50 years, something will have to be done during the life of the present generation to relieve the strain on this source of power. Our methods of using coal will have to be made more efficient, and the other sources of energy, oil and water-power, will have to be developed. Engineers are now tremendously interested in these problems, and when industry is ready to cope with them, the technical solutions will undoubtedly be waiting.

Engineers point out, in the first place, that we are wasting our coal by not removing from it all the valuable by-products which go up in smoke when coal is burned under boilers. These by-products, which can be manufactured into a great variety of commodities ranging from medicines to explosives,



to have a daily capacity of 100,000,000 cu. ft. of gas. *(Gas Age-Record)*



(Century Co.)

This map shows the geographical location of our principal coal resources.

can be reclaimed when coal is "coked" in the process of manufacturing coke or gas.

It is ridiculous, engineers say, to burn raw coal for fuel. Take the by-products out and then burn the coke, they suggest. If we give up the idea that we must burn raw coal we shall be able to use the lower grades of the fuel, in the form of briquets or gas. This is now practiced in Europe.

How to Use Coal Efficiently

BEHIND most schemes for improving our methods of using coal is this central idea: the coal should no longer be carried whole to the point where the power is to be consumed. It should be converted into some less solid form of energy at a central station, either at the mine mouth or at some strategic point for the supplying of power to a large district.

Floyd W. Parsons, writer on industrial subjects and editoral director of the *Gas Age-Record,* believes that the problem can be solved by converting the coal into both gas and electricity at the mine mouth. The gas, he says, should be carried in welded pipes from the mines to the factories, just as petroleum is now piped over great distances. It should be used for industrial processes requiring great heat, for which power in the form of electricity is uneconomical. The coke which will remain after the gas and other by-products have been extracted should be placed, while still white hot, under boilers which will supply the steam for the generation of electricity. This can be carried over electrical conduits to factories which need it for motive power. This ideal scheme will eliminate the railways entirely from the transportation of power.

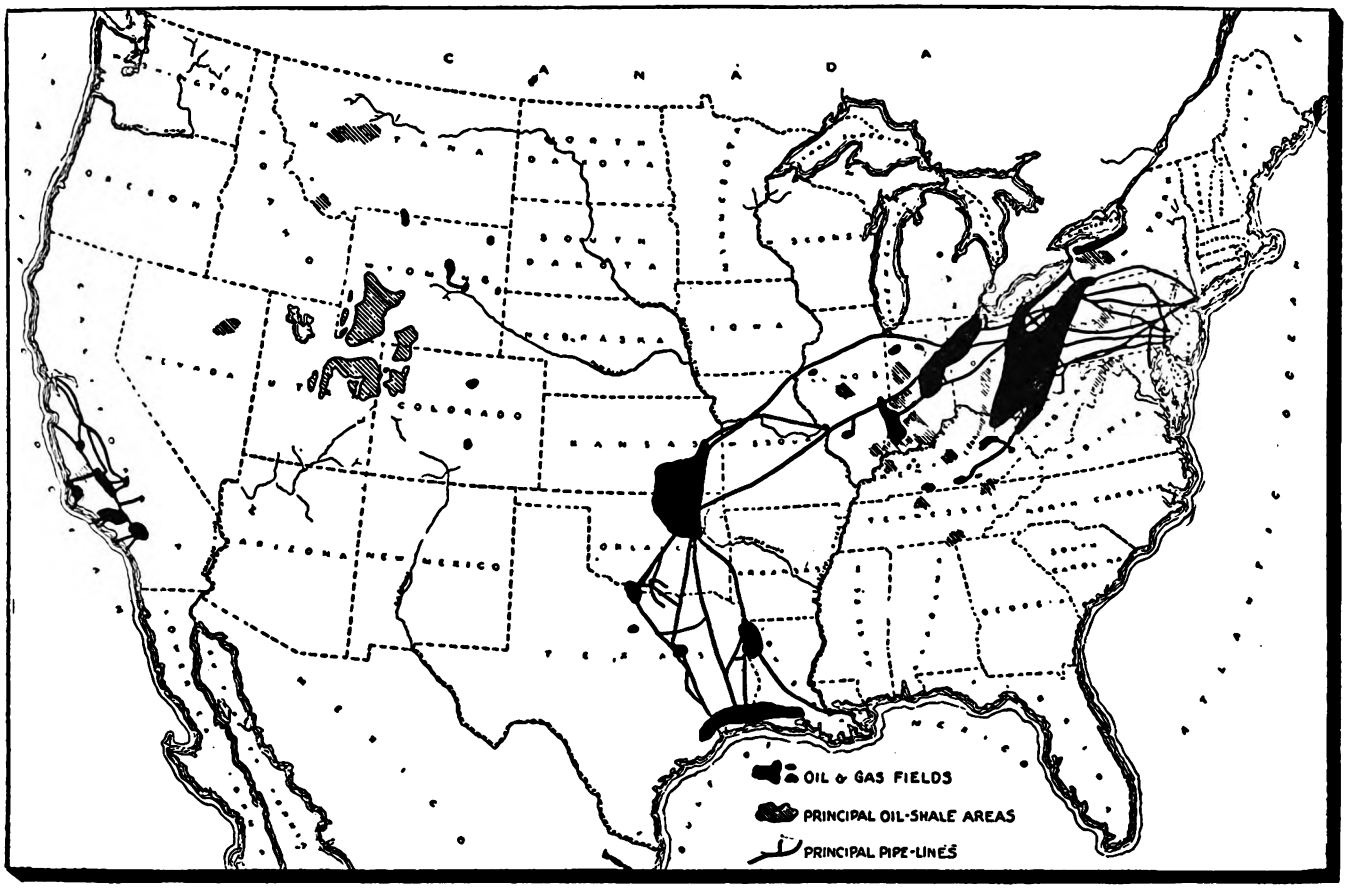
Even if our coal resources could be used with maximum efficiency, according to some such scheme as that suggested by Mr. Parsons, it would still be necessary to supplement this fuel by using to the fullest possible extent our other power resources—oil, waterpower, and to a more limited degree, natural gas.

The U. S. Geological Survey recently estimated that the total oil reserves of the country amount to 9,150,000,000 barrels of 42 gallons each. These reserves are distributed among the States as follows:

	Millions of barrels
New York	100
Pennsylvania	260
West Virginia	200
Ohio	190
Indiana and Michigan	70
Illinois	440
Kentucky, Tennessee, northern Alabama, and northeastern Mississippi	175
Missouri, Iowa, North Dakota, Wisconsin and Minnesota	40
Kansas	425
Oklahoma	1,340
Northern Louisiana and Arkansas	525
Texas, except Gulf coast	2,100
Colorado, New Mexico, and Arizona	50
Wyoming	525
Montana, Nebraska, and South Dakota	100
Utah, Nevada, Oregon, Washington, and Idaho	80
California	1,850
Eastern Gulf coastal plain and Atlantic Coast States	10
	9,150

"Of these 9,150,000,000 bbl. of oil over 4,000,000,000 bbl. are in the heavy-oil group, including fuel oils, and 5,000,000,000 bbl. in the light-oil classes," says David White, chief geologist of the U. S. Geological Survey. "The Lima-Indiana field is credited with 40,000,000 bbl., and approximately 725,000,000 bbl. are believed to remain in the Appalachian States. These estimates relate to oil in the ground recoverable by present methods. It was the unanimous conclusion of the committee that except for small areas in western New York and northern Pennsylvania where 'water drive' has long been in operation, any attempt to forecast quantitatively the increased recovery, perhaps 40-80% to be won in the different regions, fields, and pools by improved methods of recovery would introduce an element of uncertainty far greater than that entering into the present estimates.

"The total exceeds the estimate last published by the writer by 2,000,000,000 bbl. The anomaly of growing estimates simultaneous with exhausting resources is explained by the widespread wildcatting during and since the war; by the vastly greater volume of information touching all areas available for use by a larger and more diverse body of oil geologists in the



(Century Co.)

This map shows geographical location of the principal gas and oil fields of the U. S.

committee; by the more thorough methods of calculating oil reserves and the experience developed in their use; and by the fact that the earlier estimates were far more conservative.

"It is more than probable that, in most instances, the actual yields of the producing States will exceed the estimates, but it is equally probable that for the older producing States the excess will not be large compared to the whole amount. Greater uncertainty attends, of course, the States of present small production and less complete exploration and development.

"It may be noted that the oil reserves of the United States, as estimated by the committee, comprise one-seventh of the oil reserves of the world, as estimated by Stebinger and White. From these figures, it would appear that this country, with an original content of about 14,000,000,000 bbl., was much fuller of oil than other parts of the earth or, which is more probable, the estimates for some of the other countries are too low.

"*Contrary to the statement that the oil reserves of the United States will be exhausted in 20 years, a long time will be required for the exhaustion of our oil fields. Though the estimated reserves would not survive 20 years if they could be made available so quickly as to meet the demands, even at the present rate of consumption, some of the oil pools are not likely to be discovered within a generation and some will be producing 75 years from now.* Therefore, if the oil cannot be so rapidly found and extracted from the ground, we must the sooner pass a point beyond which will follow a long, though naturally variable, decline.

"As our domestic production has been increasing annually a little more than 6%, during normal years, with occasional special jumps, a much larger increase in the amount of imported oil has been necessary to fill the gap between domestic production and domestic requirements. While the output of the fields in the United States in 1913 was 248,000,000 bbl., an 11% increase over that of the preceding year; in 1918, 356,000,000 bbl. 6% increase; 1919, 378,000,000 bbl. 6% increase; 1920, 443,000,000 bbl., 17% increase; and 1921, 470,000,000 bbl., 6.1% increase; our importations of petroleum, mainly from Mexico, for the same years were, respectively, 18,000,000 bbl., 141% increase; 38,000,000 bbl., 25% increase; 53,000,000 bbl., 40% increase; 106,000,000 bbl., 101% increase; and 125,000,000 bbl., 18.2% increase. The situation is as alarming as it is striking."

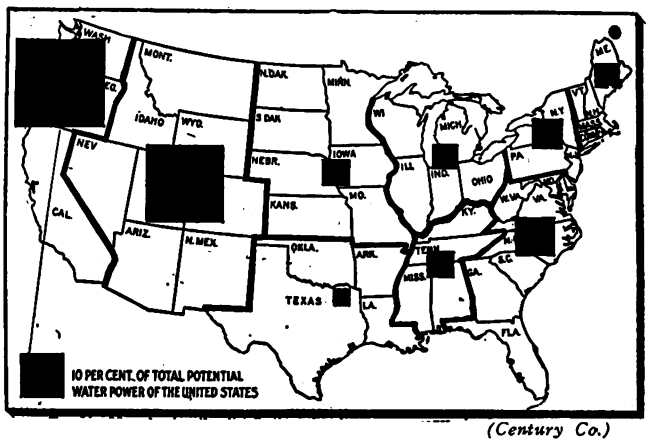
The use of oil as an industrial fuel was stimulated during the war, when the need to use all available power resources was brought forcefully before the country. The coal famine of 1917-18 so accentuated the demand for fuel oil that the character of the oil-refining industry was changed, and fuel oil replaced gasoline as the leading petroleum product. This situation did not survive the war, and the demand for fuel oil soon dropped. Experts now predict that the petroleum industry will have difficulty in keeping up with the call for gasoline, and that eventually all the petroleum used as fuel will be burned in internal combustion engines, which are not of prime importance from the industrial viewpoint.

Fuel oil today is used chiefly in the Southwest and on the Pacific Coast, where coal is scarce. It is used extensively on railway locomotives and in electrical central stations, and, to a lesser degree, in individual industrial plants. Its use, industrially, undoubtedly will grow, although it cannot be compared in importance as a power source with coal and waterpower.

The Outlook for Natural Gas

THE same is true of natural gas. Two-thirds of the nation's total annual output of natural gas—about 600,000,000,000 cubic feet—is burned in manufacturing plants under steam boilers, or used by manufacturers of glass, cement, pottery and other products that require intense heat. The production of gas, however, is declining, and its use, while important, is confined to parts of the country where it occurs in abundance.

Coal's true auxiliary as the chief source of our future supply of energy is waterpower. The total potential waterpower of the country is estimated at anywhere from 100,000,000 to 200,000,000 h.p., of which about 50,000,000 can be used without special provision for storage. This is spread over almost the entire country. Sections without coal resources, such as New England, the South Atlantic States and the Pacific slope, have the greatest abundance of waterpower,



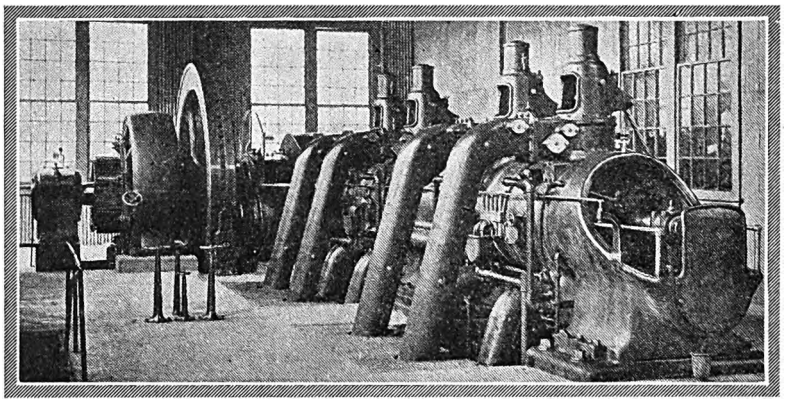
(Century Co.)

The distribution of waterpower resources in the U. S.

so that the development of this resource would mean the more equitable distribution of power, and therefore of industrial opportunity, among the potential manufacturing States of the Union.

The development of this waterpower has been slow. The total amount of energy consumed in the United States has increased greatly in recent years, but only about 10% of the increased demand has been met by the development of waterpower. Today the hydroelectricity produced is the equivalent of about 55,000,000 tons of coal annually, whereas nearly 400,000,000 tons are used to produce steam power directly applied or used for the generation of electricity.

The slowness of this development is due to a number of unavoidable difficulties. Federal restrictions, which make necessary the issuance of Government permits before some 75% or 80% of the potential waterpower can be developed, have increased the sluggishness of growth. But more important is the fact that the cream of our coal and oil supplies can be tapped more easily than our waterpower reserves. The use of fuel, moreover, is sanctioned by habit and historical development. A waterpower development involves a heavy initial expenditure, whereas the first cost of a steam plant is comparatively low, and the greater expenses of fuel can be carried along from year to year. Great waterpower projects are likely to meet with public objection if there is any reason to suspect that they will endanger the scenic beauty of a river or a waterfall. For all these reasons the development of waterpower is slow.



(Gas Age Record)

400 k.w. gas engine installation.

The Power Engineer's Ideal

MOST engineers believe that the central station transmitting electrical power is the device which will make possible the fullest and most economical use of our resources. The waterpower of the nation can be used extensively only if central stations are employed; and engineers believe that coal can be burned more economically in generating plants supplying relatively large areas than in individual factories. The combination of water-driven central stations with coal-driven central stations, in a system blanketing the United States, is the engineer's dream of efficient power production for the nation.

Forward-looking engineers in the industrial power field are now getting their technical equipment ready for the installation of such a system.

"In a large industrial district with which the writer is familiar there is a large load ready and waiting to be connected with the central-station systems, and were there a wholly adequate and reliable supply of power at the disposal of the power companies in this territory, their present large aggregate load would be greatly increased," said Col. John Price Jackson, in a paper read before the American Society of Mechanical Engineers.

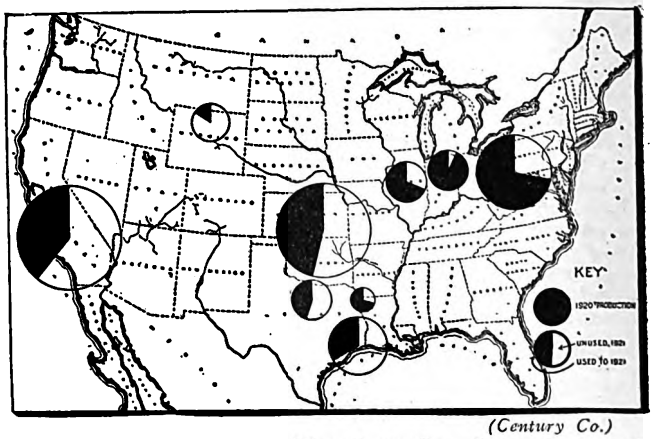
"Expressed opinions of industrial and central-station men, as well as various statistics, justify the conclusion that an equally pressing situation exists in most or all of our important industrial centers.

"The shortage of central power is serious by reason of the fact that it interferes materially with the natural productive growth of our country and with the prosperity of its several communities. Another even more serious element relating to such power shortage is the fact that it continues the use of a large number of isolated steam and electrical plants, most of which are consuming from two to four times the amount of fuel which would be required were the power supplied from efficient central stations. Moreover, the lack of sufficiently adequate central power systems makes impossible the economic utilization of many water powers which would become available if they could pump their power in the form of electrical energy into great electrical distribution systems having heavy demands.

"To so develop the central power systems within a reasonably short time that they will meet the present deficiency, absorb the great amount of unconnected or isolated loads, care for the natural growth of demand, and utilize our fuels and water powers most advantageously, represents, in this country, a problem of gigantic dimensions which will require much wisdom to solve."

In Col. Jackson's opinion, the following factors toward the development of a central station system should be thoroughly considered by competent power men:

"1. To so arrange by interconnection of transmission systems and otherwise that the maximum amount of waterpower may be developed. The amount of waterpower utilized can and will greatly increase with the rapidly growing power demands, but in many important industrial sections of the country, where waterpower is scarce, it will require much wisdom to cause the increase to become a greater percentage of the total power than now exists. Many watersheds having reasonably constant flow, however, but not accessible for con-



(Century Co.)

The eclipse of petroleum. Map shows the relative degree of exhaustion of the principal oil-fields of the U. S.

nection normally with central power systems, can possibly become of early value for developing the electrochemical processes of the country, and incidentally in reducing the consumption of fuel.

"2. To place steam plants, as far as possible, close to coal mines or on waterways in order that energy may be transmitted as much as possible in the form of electric power rather than in the form of coal, with resultant reductions of freight charges and relief to railroad traffic.

"3 To supply practically all industries with power from central power systems, which would result not only in an enormous coal saving, but also in a large saving in man power, maintenance supplies, and in transportation.

"4. To largely electrify the railways. This would make possible a great reduction in the fuel used for transportation purposes and relieve the railroads from carrying a large dead weight of coal freight for their own purposes, and also would make available the materially increased duty of railroad trackage and equipment which is possible by electrification.

"5. To not only make the central stations adequate for all of the above purposes and the expected future growth, but fully reliable.

"6. To conserve a larger proportion of the valuable chemical constituents in the coal; such products are now recovered from only a small percentage of the total coal mined. Closely related with this problem is the conservation of our oil and natural-gas supplies. A discussion of these problems is not directly within the sphere of this paper, but it is believed that the suggestions for power development contained herein are along lines to coördinate with their solution.

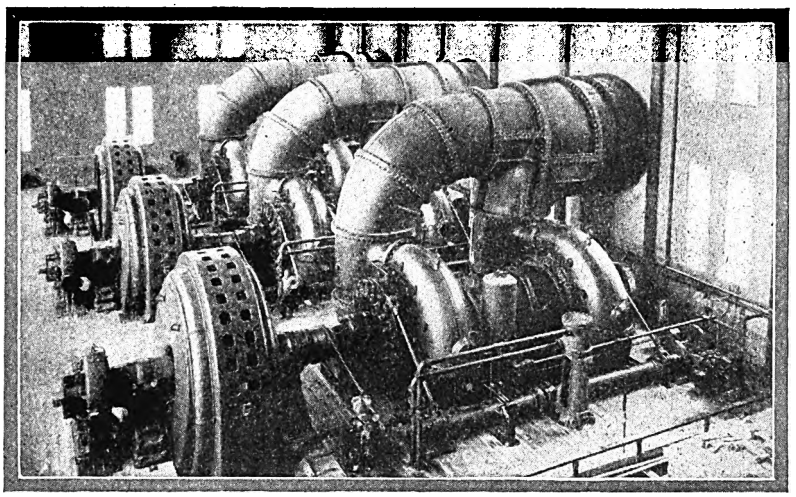
"7. To work out programs which will enable the financing of our power systems to be handled with facility. By the census there were three billion dollars invested in 1917 in the central-station industry, not including electric railways. About double that is needed now or as soon as the equipment can be produced, say, in 1922 or soon thereafter, and at least four times the 1917 capital will be required well before 1930 if reasonable progress is made."

The super-power plan, developed by the U. S. Geological Survey, contemplates the installation of such a system in the industrial States of the northeast Atlantic Seaboard, W. S. Murray, a New York consulting electrical engineer, summarizes as follows the effect of the super-power plan:

"It provides a means," he says, "by which, conservatively speaking, one ton of coal will do the work of two, and the railroads within the zone, and those carrying coal into the zone will be relieved of transporting one-half the amount of coal required for power and lighting purposes. In short, the value of machine capacity from a utilization standpoint will be increased three to fourfold, and coal resources for the purposes named conserved twofold.

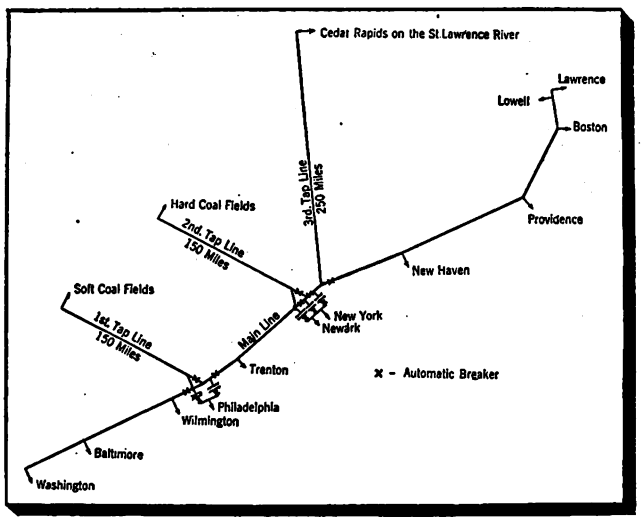
"This means that a present plant capacity of 17,000,000 h. p. can be replaced by one of not greater than 5,500,000 h. p., and that not less than 30,000,000 tons of coal per annum can be saved, which at $5 a ton will represent $150,000,000 a year.

"Besides the above savings, two great departments of economy will be created; one applying both to the railroads and the industries, in the reduced cost of maintenance of machinery, and the other applying to the railroads alone, in the reduction of train miles, by virtue of this plan permitting consolidation of trains with resultant savings in train miles. It is estimated that these latter economies will effect a saving of another $150,000,000 annually, thus making a total saving of $300,000,000."



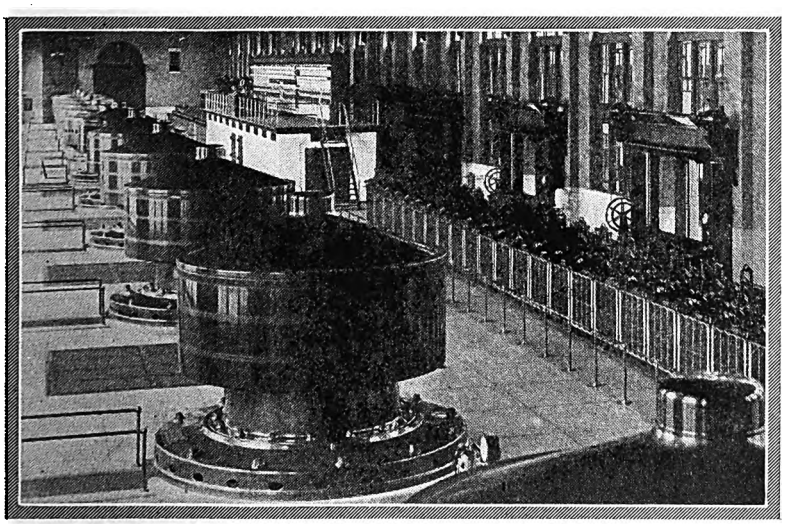
(Galloway)

Some of the largest turbo-generators in the world handling peak loads at Spokane, Wash.



(Century Co.)

The plan of the super-power zone.

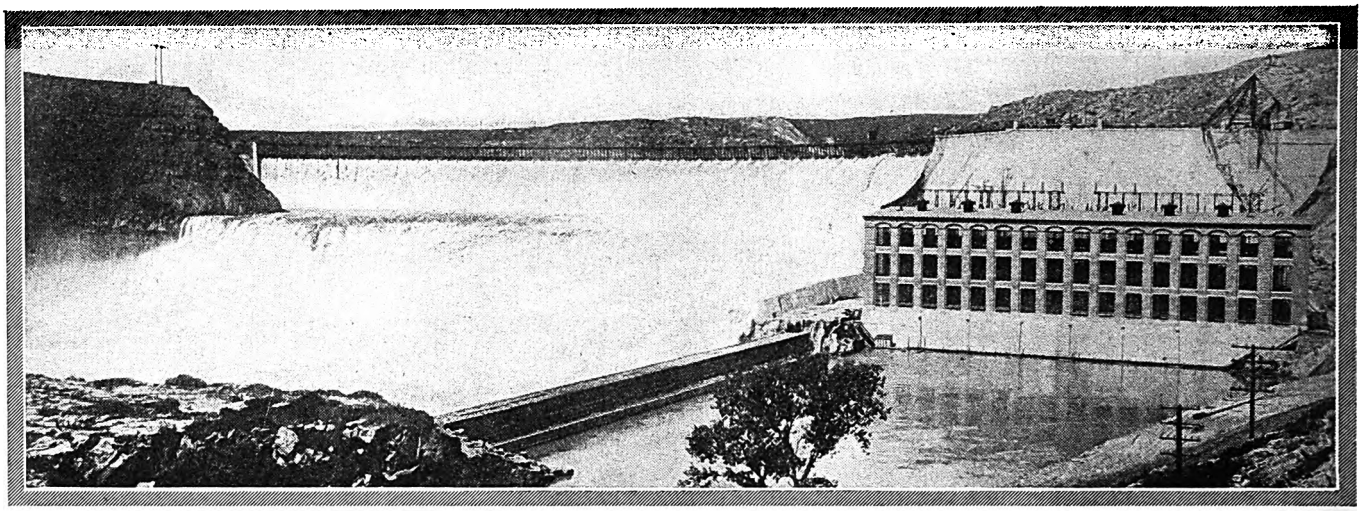


These are the turbo-generators that transform Niagara's falls into electric current.

A Storehouse of Electric Energy

THIS is to be accomplished through the operation of a main 250,000 volt line connecting Washington or Baltimore with Bosfon via Wilmington, Philadelphia, Newark, New York, New Haven and Providence. The line is to be fed by three groups of large power stations, situated from 150 to 250 miles from the main transmission line. The first of these groups is to be built in the bituminous coal fields, at some location near a supply of water for condensation. The second will be in the Pennsylvania anthracite fields, and the third will be on the St. Lawrence River. The main line will be tapped by all the large industrial centers as well as by practically all the railroads along its route.

"The three generating groups would supply the



(General Electric Co.)

The next time you ride on the Chicago, Milwaukee and St. Paul, current from this hydroelectric plant will furnish the motive power to move the train.

base load or the maximum continuous 24-hour power for all the territory fed by the main line—amounting to perhaps one-third of the peak load," says Percy H. Thomas, describing the superpower plant in a paper read before the American Institute of Electrical Engineers.

"To carry out this idea with the assumed conditions, the single-circuit tap lines should have the maximum possible capacity, which is here taken as 350,000 to 400,000 kw. per circuit. To secure such a capacity at 250,000 volts, requires a number of innovations, which will be discussed later.

"It will not be desirable for consumers, except the very largest, to be connected directly to the 250,000 volt lines on account of complications and the expense. Local consumers in any district can be supplied from the nearest large distributing company. Small water powers or groups of neighboring powers up to 25,000 to 50,000 kw. would be connected with the nearest distributing system without connection to the 250,000-volt system.

"As the load in the district grows, additional 250,000-volt circuits can be added from suitable generating sites—probably all more or less widely separated—preferably single-circuit lines.

"It will be desirable to make use of and depend upon the present large generating stations to supply all peak and breakdown service. Voltage would be independently controlled at the principal points of the system, as for example, Philadelphia, Baltimore, New York, Boston, as will be later explained.

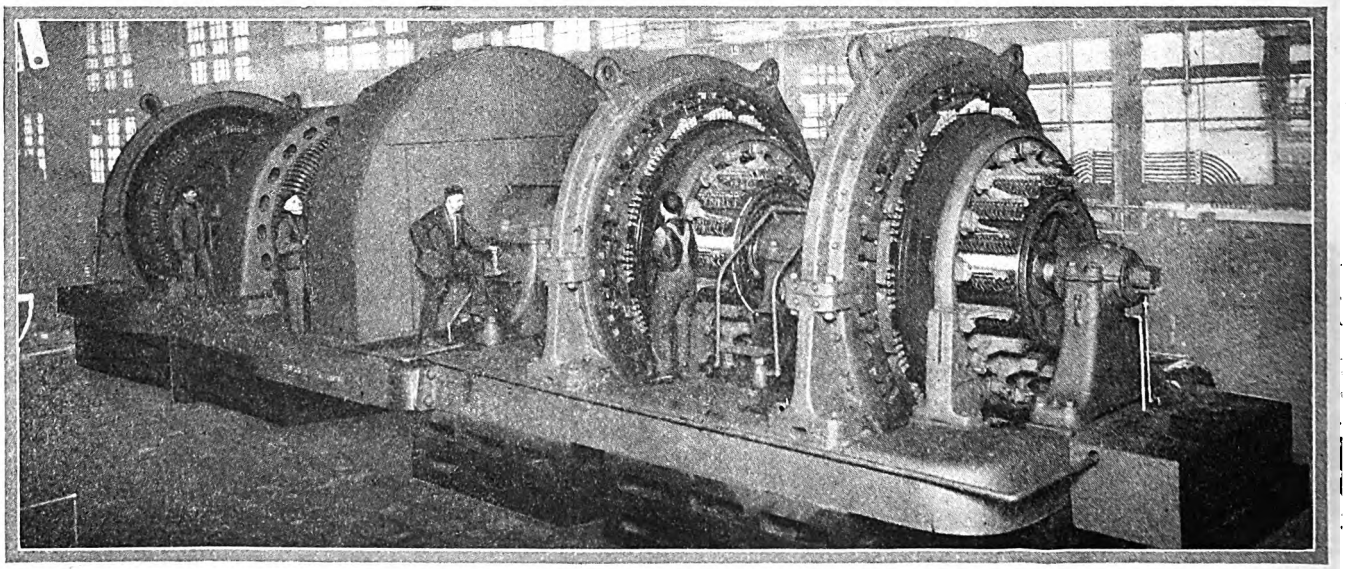
"For example, Philadelphia would receive the first tap line and control its voltage and feed the surplus up and down the main line. Similarly with Newark and New York for the second tap line, and also for the third line to the St. Lawrence if this should be later added."

The South's Superpower Zone

A TRANSMISSION system similar to that proposed under the superpower plan is now in operation in the Southeastern States. This system covers Alabama, Tennessee, Georgia, North Carolina and South Carolina. It is fed by coal and waterpower generating stations, and in 1921 it supplied a total of about 2,000,000,000 kw. hr. to a population of 11,819,585.

"The transmission system," writes Charles G. Adsit, director and executive engineer of the Georgia Railway and Power Co., in a paper read before the American Society of Mechanical Engineers, "forms a trunk line some 900 miles long with several thousand miles of main line connected. It is operated at 110,000 volts, 3-phase, and at 60-cycle frequency. All of the large waterpower and steam-generating stations in this territory are connected to this transmission system, making it possible to transfer power from one locality to another. This relieves power shortages due to periods of drought at waterpower stations, or shortage of coal at steam plants or any other unforeseen circumstances which many interfere with the power supply in the different sections. In several instances, every power station connected to this system has been operated in parallel at the same time and with marked success.

"During the month of October, 1921, a part of Georgia and

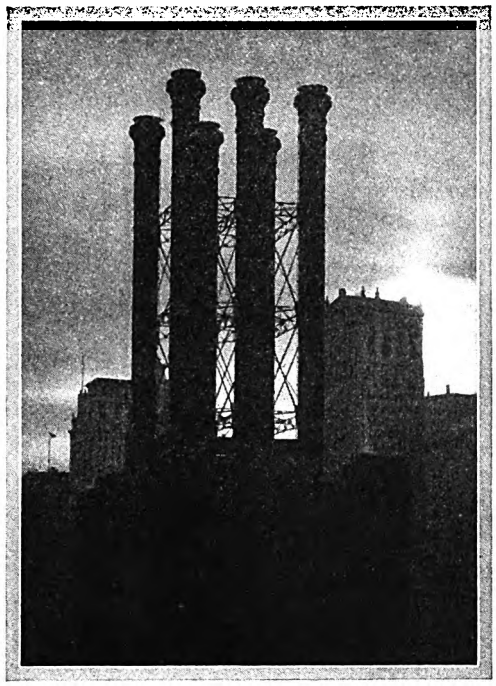


This big fellow generates the current that moves a 7000-h. p. blooming mill. *(Power)*

a part of North Carolina suffered a severe shortage in water due largely to the fact that the precipitation for the preceding six months was considerably below normal, but by means of the existing transmission system, both the affected areas were fully supplied with power from other parts of the system. Had this great transmission system not been in service, and interconnected, the industrial load in these two localities would have been necessarily dropped, since the power companies could not have supplied a larger amount of power than that required by the municipalities which they also serve. However, the other power companies by lending their assistance prevented any shutdown whatsoever in the industrial plants and the consequent unemployment of many thousand operators.

"New developments are constantly being made by the various power companies comprising this system, and there is now under construction an additional 310,000 h.p. capacity in generating equipment. This does not include 90,000 h.p. which will also be installed as an addition to one of the new plants at a later date, nor the much-discussed Muscle Shoals hydro-electric development.

"The steam-generating stations of the Southeast, generally speaking, are used for the purpose of supplementing the waterpower production. Many of the waterpower plants are, however, also backed by large storage reservoirs, making their annual output practically continuous regardless of dry months or dry years. On the head waters of the Catawba River, the Southern Power Company has constructed a very large storage reservoir at Bridgewater, N. C., which has a capacity of 13,500,000,000 cu. ft., representing 90,000,000 kw. hr. under present conditions at the various waterpower plants already constructed below. The Georgia Railway & Power Company has two storage reservoirs on the Tallulah River, one at Burton containing 5,280,000,000 cu. ft. and one at Mathis containing 1,369,000,000 cu. ft. This total storage on the Tallulah River represents approximately 70,000,000 kw. hr. at the present developments and makes available for use in power production at the plants below, about 95% of the annual stream flow. This storage will later be equivalent to 125,000,000 kw. hr., when other developments contemplated and under construction are completed."



(Galloway)

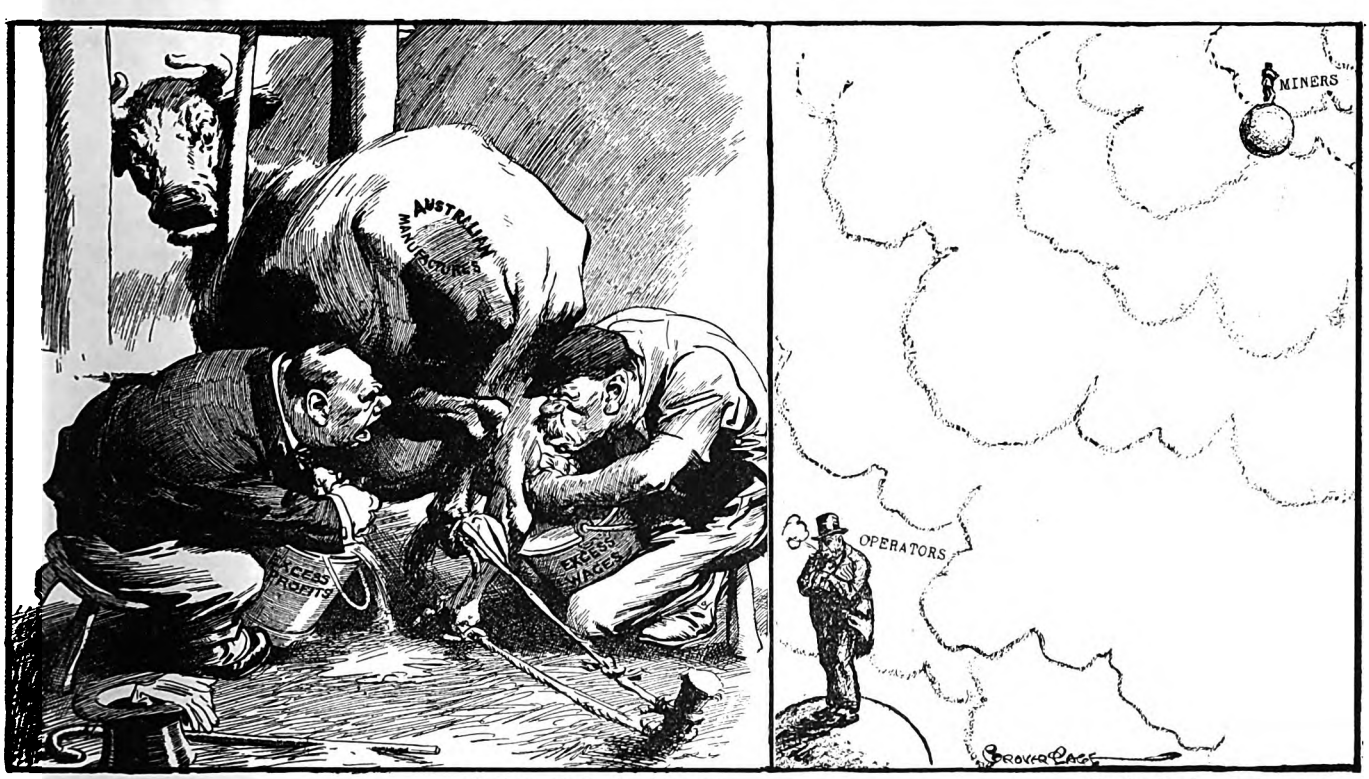
One of New York's great central stations silhouetted against the evening sky.

Cheap Power, Industry's Magnet

DEVELOPMENTS of this nature are constantly changing the industrial map. Factories naturally tend to congregate at the source of the cheapest power. Those industries in which the cost of power plays a large part are naturally the first to seek new power sources. Therefore, that section of the country which best develops those resources will attract industrial development to a greater extent than those which are content to rest on their coal mines. The paper, textile and chemical industries, for example, are constantly searching for cheaper power since this element represents a very high proportion of the total cost of the finished product.

Up to the present, America's power resources have been developed in haphazard fashion, with the possible exception of the superpower zone plan. But the time is close at hand when haphazard development will no longer be practical. Our power resources are not inexhaustible and if our future industrial growth is to reach its fullest proportions, we must develop those resources carefully and scientifically.

The power problem is one in which every industrial executive is vitally interested and in the solution of which everyone must take a hand. Power engineers are interested because in the development and conservation of our natural resources they are opening a vast field for greater industrial achievement.



(Sydney, Australia, Bulletin) *(Louisville Courier-Journal)*

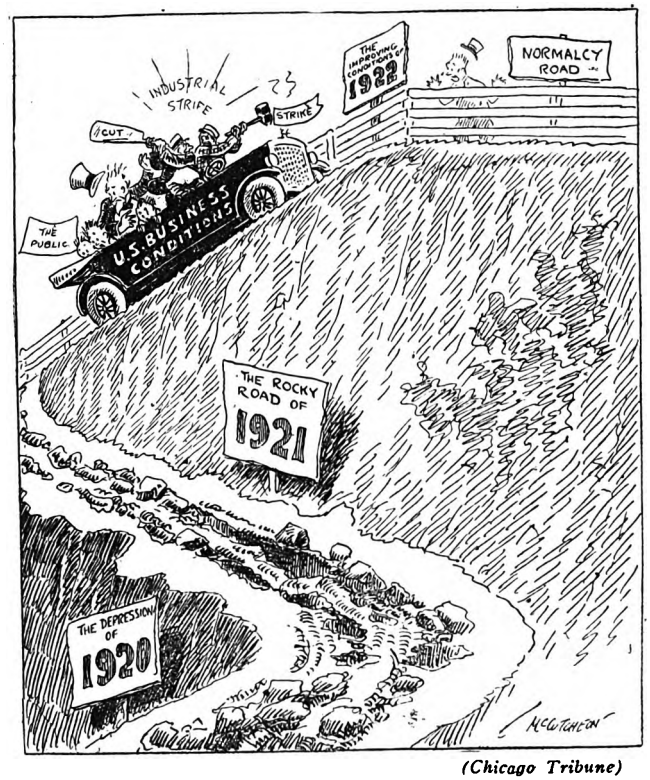
Strikes are strikes, no matter where they take place.

What Is the Outlook for Fall?

Manufacturing production has increased steadily and fundamental conditions are favorable to industrial activity if strikes do not interfere

HOW'S business? What is the outlook for fall? The economists and statisticians, whose profession is to find answers to those ever-present questions, say that manufacturing is increasing, prices are rising, and normal conditions are fast approaching. Judging by past experience, they say that business is on the upswing, and the improvement may be expected to continue.

This hopeful prospect has been held up before business for many months. One overshadowing cloud—the coal strike—has now appeared, and threatens to destroy the fairness of the prospect and put to shame the prophets of early prosperity. Since April 1, when the strike began, industry has been eating into its reserve of fuel, so that now the supply is so low that the Government is rationing out the new production of the mines. The prospect of a coal shortage in the



(Chicago Tribune)

Just as we were nearing the top.

fall and winter has become serious; and how can prosperity return if the factories cannot get enough fuel to keep a full head of steam in the boilers?

Every day that the strike continues the danger to the industrial revival grows greater. Even if the bituminous coal mines were reopened at full swing today the situation would be bad. It would be difficult, and perhaps impossible, to supply enough coal to take care of active industry. The mines could produce plenty of coal, but the railroads couldn't carry it. A reliable statistician estimated at the end of June that if the coal strike had stopped immediately, more than 900,000 cars of coal would have to be loaded each month for the rest of the year if the normal annual production were to be attained. This is very close to the maximum capacity possessed by the railroads under favorable conditions. Since that estimate was made the strike has continued for a month, and the number of coal cars available to the railroads has been reduced by the strike of the shopmen, who keep the cars in repair. Congestion is therefore inevitable, and a serious coal famine quite possible, even if the strike ends immediately.

This black cloud, however, has not yet affected business as reflected in the industrial statistics. The figures show that business is buoyant. Will this buoyancy be sufficient to overcome the handicap of the coal strike?

Ups and Downs of Business

ACCORDING to the adjusted index of the colume of manufacture, prepared by the Harvard Economic Service, the upswing of industry so far has resisted all obstacles. This index is so constructed that it does not show seasonal variations nor the variation due to increasing population and expanding industry. It is intended merely to show the periodical ups and downs of business, uncomplicated by other movements.

"Manufacturing activity seems to be exhibiting the buoyancy characteristic of upswings of the business cycle," says the Harvard Economic Service, interpreting its adjusted index. "The buoyancy is apparent despite the untoward influences of scant margins of manufacturers' profit and widespread difficulties with labor. True, the adjusted index for April—the most recent month for which data are complete—shows a slight decline. This appears to be due primarily to recessions in the textile and food groups, both of which lines have been seriously affected by the direct or indirect consequences of labor disputes. In May, the textile trades seem to have done somewhat better, notwithstanding the continuance of the serious strike of the New England cotton-mill operatives. Meanwhile iron and steel manufacture maintains its upward course. The adjusted index for this basic trade in May stands at 98.9. (Normal is 100.) For eight consecutive months the group index has registered an increase. No more convincing proof could be given of the underlying tendency toward greater industrial activity.

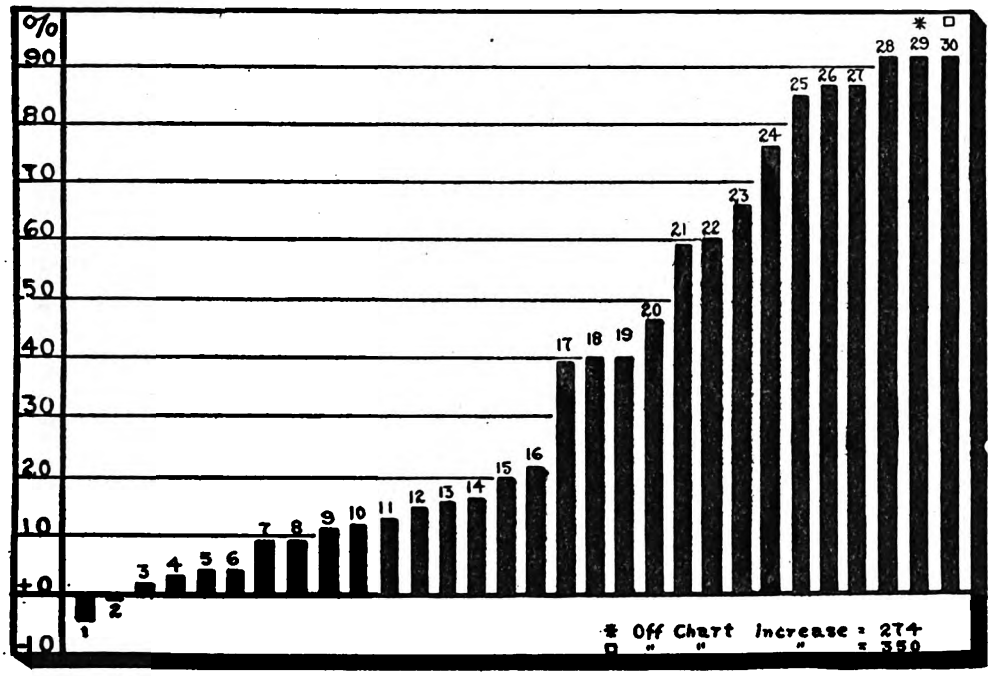
"Labor trouble is the darkest cloud upon the present horizon. Seldom has the country faced as many serious strikes at the same time. The situation in this respect bears a strong resemblance to the fall of 1919. Numerous strikes at that time—those in the steel and soft coal industries being the most important—restricted industrial output when it otherwise would have expanded rapidly. The temporary sag in production during the second half of 1919 shows this movement graphically. It will not be surprising if the episode is repeated in 1922. As yet, however, current output has manifested little retardation. A further expansion of the volume of manufacture usually features the present phase of the business cycle, and labor difficulties will only retard and will not prevent such expansion.

"The several industrial groups represented in the adjusted index have exhibited different movements during recent weeks. The increase of iron and steel manufacture has been maintained despite the coal strike. Building operations, railroad orders, and demand from automobile manufacturers have combined to give the iron and steel markets a definite stimulus. It is significant that employment data from the machinery and conveyance, automobile, and car-building and car-repairing industries agree in showing a decided improvement of conditions during the past four or five months. In all three of these important lines employment conditions seem to be now approximately on the level of the best months of the first half of 1921. Even tool makers, who have perhaps suffered as severely since 1919 as any important industrial group, seem to be somewhat more hopeful of the immediate future. In general, the metal trades are giving definite signs of the improvement in business conditions.

"The textile trades constitute one of the most significant elements in the present industrial situation. It will be recalled that these trades were among the first to experience the collapse in 1920. They were likewise among the first to touch and pass the lowest reaches of the ensuing depression. As

early as January, 1921, both cotton and wool manufacture had begun to show an increase in volume. By the closing months of 1921, textile manufacture had assumed proportions distinctly above normal. Then a definite decline began in the output of cotton goods. This has been lately accentuated by the serious strikes in New England. The adjusted index for cotton manufacture, which stood at 109.0 in November 1921, had fallen to 82.5 in April. Wool manufacture, upon the other hand, succeeded in maintaining high output through last March. On March 27, however, two of the largest textile mills in New England, among the most important consumers of raw wool, ceased operating. This, together with generally unsatisfactory business in the worsted lines of the trade, brought a precipitate drop in the adjusted index for wool manufacture—a fall from 125.8 in March to 83.5 in April. Reports of raw cotton consumption in May indicate a substantial recovery in that month; but the textile trades, which a few months ago were doing relatively a decidedly larger volume of business than most other important industries, now show rather less output than most other lines. Underlying factors in these trades seem to be distinctly unsatisfactory. Labor troubles persist; and a recent rise of the price of raw materials has not been accompanied by a corresponding advance in the price of finished goods, so that manufacturers' margins, already uncomfortably narrow, have been further reduced. All told, the situation is not ripe in these trades for sound industrial expansion."

Record of Manufacturing Activity this Spring



1 New Incorporations
2 Mail Order Sales
3 Silk Consumption
4 No. Employed U. S.
5 Newspaper Advertising
6 Bank Transactions
7 Petroleum Consumption
8 Postal Receipts
9 Chain Store Sales
10 Bradstreet's Index No.
11 Cotton Consumption
12 Freight Car Loadings ex-coal
13 Customs' Receipts
14 Newsprint Shipments
15 Cement Shipments
16 Wool Consumption (2 Mos.)
17 Coke Production
18 Copper Production
19 Lumber Shipments
20 Sugar Meltings
21 Zinc Production
22 Pig Iron Production
23 Auto Shipments
24 Building Volume
25 Rubber Imports
26 Lead Receipts, St. Louis
27 Steel Ingot Production
28 Structural Steel Sales
29 Freight Car Construction
30 Tin Imports

The increase in activity has been unevenly spread over the several industries. The Brookmire Economic Service has prepared a chart, reproduced herewith, showing the varying degrees in which various sets of industrial statistics showed the increase in activity in 1922 over 1921. Two items showed a decrease; new incorporations and mail order sales. The smallest increase was shown in silk consumption, and the largest in the imports of tin.

"Of the two which failed to reflect improvements, one, new incorporations, showed a very heavy increase in May over the two preceding months," says the *Brookmire Forecaster*. "It is a characteristic of this factor to show its heaviest increases after the period of prosperity has been well advanced when the evident profits of old-established firms bring many newer enterprises into the field. Mail order sales still reflect low agricultural purchasing power. That this slowness of ultimate consumer purchasing is not general is shown by the chain store sales, in which there was an 11% gain over the same period of 1921. Of the others the greatest gains over the preceding year occurred in steel and allied lines, in metals in general, and in the construction industries. The total result is encouraging and bears witness to an improvement that is general with practically every field of activity showing an upward turn."

Increases in prices as well as in production have lacked uniformity. As the Harvard Economic Service points out, "at a time when prices in general are changing, the prices of individual commodities do not all change at the same time nor to the same degree. For example, during the second half of 1920, when prices in general were declining very sharply, a number of commodities continued to sell at high figures while others fell very low. Such diverse movements create a condition of maladjustment and make normal trade impossible."

Normalcy Still to Come

IN the past year, the Service says, many of the inequalities in commodity prices have been evened out, and the situation has improved. The readjustment has been brought about mainly by the increase of prices that were too low. A normal situation, in which the prices of various commodities would bear the same relations to each other as they bore in 1913, has not yet been reached.

The commodity price list as a whole, regardless of discrepancies among individual commodities, has been upward, and will continue so for several months.

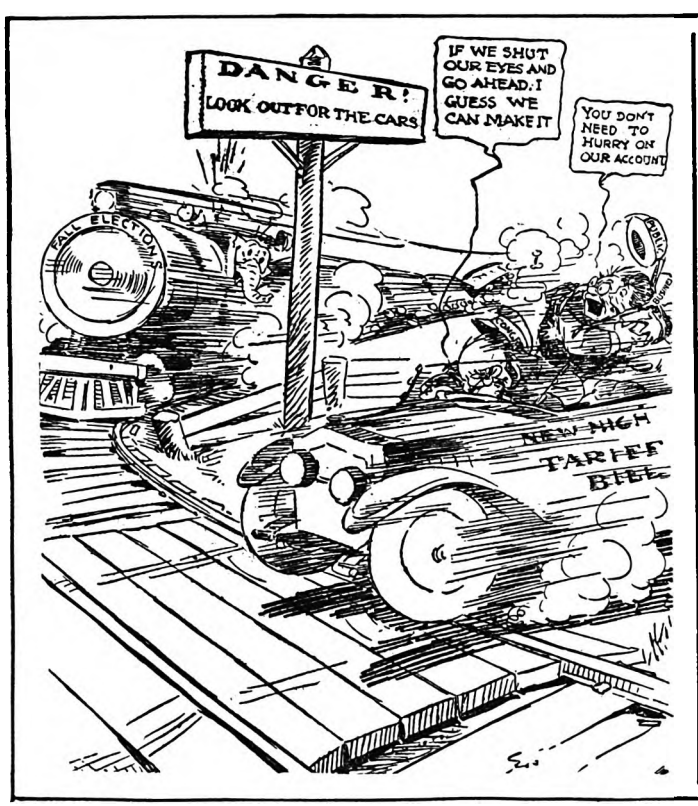
"The upward trend of commodity prices in the United States is shown by all the available indices of wholesale prices," the Service continues. "The newly revised 'all commodities' index of the U. S. Bureau of Labor Statistics, which is based on more than 300 individual price quotations, has risen from 138 in January to 148 in May of the current year. Bradstreet's index has been steadily advancing for 12 months; and Dun's index, for the last 11 months. Our own ten-commodity index has been moving upward beginning last September and has been rising sharply since last April.

"The weekly quotations for more than 200 commodities presented in Dun's *Review* exhibit the same upward trend. From September 2, 1921, to June 23, 1922, the number of advances has been larger than the number of declines in 36 out of the 43 weeks, and this relationship has been especially marked in recent months.

"A comparison of prices in March and June, 1922, shows that prices have advanced during the second quarter of the year. Of the 52 important commodities listed in the table in Dun's only 9 declined during the quarter. Eight remained unchanged and the other 35 advanced. The commodities which declined were wheat, flour, beeves, hogs, lard, cotton finished goods, linseed oil, hard maple, and red gum. Those which remained unchanged were barley, oats, sheep, leather, steel rails, glass, oak, and petroleum. These commodities reflect accurately the general trend of wholesale prices.

(*Turn to page 1387*)

Reckless Driving Is Liable to Land One in the Mud



(Philadelphia North American)

What's the hurry?



(Omaha Morning Bee)

Come out of there!

Pulling the Wool Schedule Over Your Eyes

EVIDENTLY the proposed wool tariff is a bigger steal than the famous (or infamous) Schedule K, since even the most conservative papers of both parties are ridiculing it. The *New York Times* quotes Senator Knute Hansen of Minnesota as saying that all opposition to the high rates provided for in the Fordney-McCumber tariff bill is "love's labor lost," that the "Wool Philistines" have the Senate by the throat, and that the so-called farm rates were written in the bill to make it easier for the farmer to swallow the high duties on wool and manufactured goods.

It is pointed out that Senator Nelson is one of the survivors of the group of Republicans who fought the Payne-Aldrich bill in 1909. In his recent charge he gave the wool Senators to understand that bad as was the Payne-Aldrich measure, the one now before the Senate is even worse. He called the bill "protection run mad."

Senator Simmons, the ranking Democratic member of the finance committee, declared recently that wool was the keystone of the "hard-and-fast compact" that had been formed to force the Fordney-McCumber bill through.

A similar opinion appears to be held by *Textile World*. In a recent editorial headed "What Is the Ulterior Motive?" this publication says: "So preposterous is the idea of a 15% ad valorem duty on all cotton not specifically provided for in the Fordney-McCumber tariff that it is only natural that some ulterior motive should be sought to account for the submission of such an amendment by Senator Gooding of Idaho, the leader of the agricultural tariff bloc. Possibly the Senator feels the need of securing Southern support to ensure the adoption of his own ridiculous tariff rates on clothing wool, but if he knows anything about Southern tariff sentiment he knows that the most rabid Southern protectionist would hesitate to advocate a duty on short cotton. . . ."

Senator Heflin recently charged that there was a combination of big wool interests speaking for and voting for measures that put money into their own pockets. A prominent Democratic Senator is said to be considering the introduction of a resolution for the purpose of ascertaining whether there are members of the Senate who are personally interested in the wool business and are actively supporting the high wool rates now being voted into the bill. But all this "investigation" is superfluous, according to the *Nation:*

"What's all this vocal shooting about in Congress in connection with the wool tariff? Ex-Senator Lippitt of Rhode Island says he didn't write the proposed high-duty clauses and Senator Lenroot says that he did. Well, if he personally didn't write them, they were written by the wool manufacturers' association in which Senator Lippitt is a leading figure. What the difference is we can't see, still less can we understand how anybody can get excited over the charge. In Heaven's name, what has been happening, lo these seventy years, in connection with our tariffs other than that the schedules were written by those who were intended to benefit by them?"

On page 249 of the Senate rules is found the paragraph which deals with the propriety of members of Congress voting for legislation in which they may be interested. This rule is to the effect that:

"When the private interests of a member are concerned in a bill or question he is to withdraw. And where such an interest has appeared, his voice has been disallowed even after division. In a case so contrary not only to the laws of decency, but to the fundamental principles of the social compact which denies to any man to be a judge in his own cause, it is for the honor of the House that this rule of immemorial observance should be strictly adhered to."

Steel Industry Forced to Slow Down

SINCE steel is considered the best business barometer the slowing down of steel production as a result of the rail and mine strikes may have a far-reaching effect on business in general throughout the country.

The order of the Interstate Commerce Commission, establishing priorities in all railroad traffic and in fuel distribution has thrown the steel trade into a condition of the utmost uncertainty, according to *Iron Age*. During the war-time priority shipments steel was high on the list, but the order just issued requires that the iron and steel and allied industries wait for coal until more essential consuming lines have been supplied. Even if coal begins to move at once to the preferred classes, it would take up most of the soft coal output, estimated at 4,000,000 tons this week, leaving steel and other industries to depend upon their stocks. These it is estimated are in most cases sufficient for only a 30 days' supply.

While recently the insufficiency of transportation and the lack of coal have affected steel production more than consumption, it is now to be expected that actual requirements of steel consumers will decrease along with the cutting off of shipments from the mills. Because of the fact that industries dependent on steel will be forced to curtail production, orders may decrease to such an extent as to affect the steel market. An unknown factor, in the absence of actual experience under the rationing scheme, is the extent to which the coal output of steel company mines will be taken for distribution among preferred consumers. At best the outlook is for railroad congestion that will affect the entire industry for weeks to come.

Such a condition is particularly unfortunate. Just at a time when the steel industry appeared to have "turned the corner" toward prosperity. It was recently announced that the U. S. Steel Corporation was operating its plants on an 83% basis and was eight weeks behind in its deliveries. Net earnings for the June quarter were $27,286,945; fully $5,000,000 more than the average expectation of the unofficial forecasters. Instead of a deficit, as in the earnings for several quarters preceding, the full dividend on the preferred stock was earned and it was necessary to appropriate only $1,462,345 from the undivided surplus to pay the common dividend.

The quarterly statement also shows continued improvement in the industry. The April earnings were $7,750,054; the May earnings were $8,824,887 and the June earnings $10,711,004.

The earnings for June, which are closer to the accustomed pace of the big corporation than in normal days, it is believed, will be more than maintained during the September quarter, so that before the end of the year a considerable surplus will have been earned. The income account of the June quarter as compared with the same period of 1921 is as follows:

	1922	1921
Earnings	$27,286,945	$21,892,016
Depreciation and sinking fund	11,067,432	8,665,507
Net income	16,219,513	13,226,509
Interest and premium on bonds	5,023,158	5,139,477
Balance	11,196,356	8,087,032
Preferred dividends	6,304,919	6,304,919
Common dividends	6,353,781	6,353,781
Deficit	1,462,345	4.571,668

For the six months ended June 30 the corporation showed a surplus of $11,196,355 after paying taxes and charges, equal to 88 cents a share, on the common and preferred dividends, against $23,562,637 or $2.15 a share on the common, in the same period of 1921. Current earnings are even more gratifying, according to experts in the trade.

"Steel stocks during the past two weeks," says the Brookmire Economic Service, "have displayed considerable strength and on the average they are selling very close to the high point reached during the early part of June. In other words, they have practically made up the decline which occurred during the month of June. The explanation of the strength in the steel stocks is to be found in the fundamental situation which governs the steel industry. Several of the independent steel companies have issued their reports for the second quarter of the current year indicating substantial improvement in the earnings. Republic Iron & Steel for the second quarter showed a profit as against a substantial deficit during the first quarter. While Colorado Fuel & Iron and Lackawanna Steel each showed another deficit for the second quarter, the deficits were considerably smaller than during the first quarter. Vanadium Steel for the first six months showed a slight profit as against a deficit for the corresponding half of 1921.

Steel prices have remained unchanged during the past month while pig iron prices have advanced. The market is strong technically and fundamentally and, due to the coal and railroad strikes, this strength is intensified. The rate of pig iron and steel production continued to increase during the month of June, and orders have increased. The fundamental position of these stocks as affected by commodity markets justifies the expectation of further appreciation in these groups during the fall months.

"Since the low point in July 1921, pig iron production has increased 168% or from 864,642 tons last July to 2,309,348 tons in May. Should the daily rate of production in May be maintained for the balance of this year, production will amount to 25,532,000 tons. This amount is practically identical with the nine year average 1907 ot 1915, inclusive, which amounted to 25,400,000 tons, but is 4,500,000 tons below the five-year average 1916 to 1920, inclusive, which averaged 30,100,000 tons.

"Steel ingot production since July of last year has shown a steady increase and May production was 237% above July. If the daily rate of production in May were continued for the balance of the year, steel ingot production this year would amount to 29,580,700 tons against 30,280,000 tons in 1913. Over the same period the price of pig iron has advanced 29.5% while composite steel has advanced but 7.5%. The question naturally arises, will the country's requirements this year in iron and steel be in excess of the pre-war period and will prices on both show further advances. It is evident that in what may be called normal conditions, the country's requirements absorbed about 25 million tons of pig iron and 30 million tons of steel.

"Production of pig iron in 1921 was but 16,500,000 tons and steel ingot production amounted to 16,823,000 tons; this leaves 9,500,000 tons of pig iron and 13,200,000 tons of steel short of normal requirements. Assuming that last year's shortage will be largely made up this year, pig iron production should amount to over 35 million tons, and steel production to over 40 million tons.

"While these figures are not given as absolute estimates of production this year, we are inclined to believe that in both iron and steel this amount will be approximated."

Further Decrease in Production?

STEEL production increased rapidly during the first three months of the year and increased slowly for the first three months of the coal strike, reaching its maximum rate in June. Since then, according to the New York *Times*, "There has been a decrease of between 5 and 10% in production and with a continuance of the present fuel and transportation conditions, there may be a further decrease of 15 to 25% in the next few weeks."

There is no way of estimating the curtailment in steel production caused by the coal shortage with exactness, and the amount of decrease in consumption can not be estimated at all. July and August are always dull months in the steel market. At the beginning of July, practically all mills were sold up for an average of about three months. With production and consumption restricted these orders will probably carry the mills for four or five months, possibly longer. Many mills have decided not to sell for long delivery. Those consumers who find immediate deliveries imperative in many instances have been forced to pay a premium for early delivery.

Are We Facing a Cotton Shortage?

IN a recent speech before the American Cotton Manufacturer's Association, Sir Auckland Geddes stated that cotton spinners in Great Britain were afraid of a cotton famine. That there may be some cause for this fear will be seen when the facts in regard to consumption and production are taken into consideration. First of all, it must be remembered that we are not only returning to pre-war consumption of cotton, but in addition to pre-war needs there will be the extra demand due to increased population and to the fact that a larger portion of the world is learning to use cotton cloth. In the years immediately preceding the war world consumption of American cotton was:

1911-12.....14,600,000 bales
1912-13.....14,750,000 bales
1913-14.....14,250,000 bales
Average.....14,530,000 bales

It is estimated that when pre-war consumption is reached the South must produce 14,500,000 bales every year if a portion of the world's spindles is not to stand idle. Unless this average is maintained during the next five years a serious situation is certain to result. And in spite of the fact that the during the past seven years Southern cotton planters have had the incentive of thirty and forty cent crops and have had more than 37,000,000 acres planted in two of the years, the crops have at no time reached 14,500,000 bales. From 1915 to 1921 the crops have been, according to the SOUTHERN TEXTILE BULLETIN:

1915.....12,862,000 bales
1916.....12,738,000 bales
1917.....11,360,000 bales
1918.....11,360,000 bales
1919.....12,252,000 bales
1920.....13,366,000 bales
1921..... 8,000,000 bales
Average.....11,760,000 bales

This is an average production of 11,760,000, which is just 2,740,000 bales less than must be produced to meet the demand of pre-war consumption. Only three times in its history has the South ever exceeded 14,500,000 bales and these were years of record-breaking acreage and splendid weather conditions.

1911, 36,681,000 acres, 16,101,000 bales
1913, 37,458,000 acres, 14,552,000 bales
1914, 37,406,000 acres, 15,136,000 bales

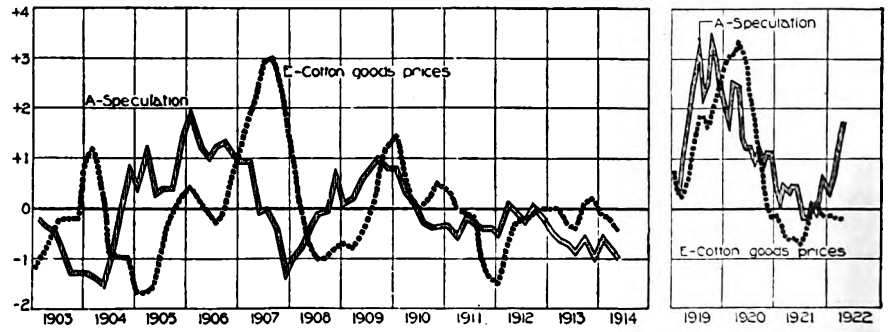
These crops were produced with Georgia raising 2¼ to 2¾ million bales and South Carolina contributing 1½ million bales. Since the boll weevil has reached these states, it is not believed that these yields can again be equalled. But the battle against the boll weevil is only one of the reasons why cotton production in the South is falling off. A majority of cotton speculators and cotton manufacturers have done everything to depress cotton and to drive the farmers from the cotton farms of the South. Then, too, the fact that during the war millions of young farmers were enabled to catch a glimpse of the outside world has not made them eager to return to farms where only a meager living can be earned.

Although it is generally asserted that the public will not pay higher prices for cotton, the law of supply and demand may eventually force prices far beyond their present level.

In many quarters it is believed that the textile strike in New England will work to the benefit of the South, because it has increased the activity of the Southern mills and attracted attention to the lower production costs maintaining in that section. But students of the problem who face the real facts in the cotton situation believe that the spinners of England and New England will in the near future put aside rivalries and prejudices and meet together to discuss means for increasing the production of cotton to a point that will satisfy the needs of the spindles of the world. The SOUTHERN TEXTILE BULLETIN predicts that within two years, unless steps are taken to increase production considerably, the cotton manufacturing world is going to be hard pressed for sufficient supplies.

Industrial Expansion in the South

A LARGE part of our manufacturing is done on the Eastern seaboard, north of the Mason-Dixon line, and in the Central States east of the Mississippi River and north of that familiar line. Yet the probabilities are that in the next 100 years there will be more industrial development in the South than in any other regional district of the United States.



Cotton goods prices compared with the volume of speculation on the New York Stock Exchange, showing the tendency of cotton to soar in panic years, as in 1903 and 1907. Since 1919, however, cotton prices have been consistent with the movement of the stock market.—*(Harvard Economic Service.)*

The South's resources in timber, fuel, ore, sulphur, oil and so on, plus its favorable shipping facilities, place it first in line for industrial development.

Richard H. Edmonds, writing in *Forbes' Magazine*, gives the following figures covering the South's production of our raw materials:

Nearly 100% of the country's cotton crop, or about 60% of the world's cotton output.

About 100% of the country's sugar cane.

About 100% of the country's bauxite, the foundation of its aluminum industry.

About 100% of the country's turpentine and rosin, which prior to the outbreak of the Great War was about 85% of the world's output.

About 99% of the country's phosphate rock.

About 92% of the country's crude barytes.

About 75% of the country's natural gas gasoline.

About 76% of the country's coal output prior to the strike and now a very large part of the total output.

About 66% of the country's commercial fertilizers.

About 57% of the country's petroleum, or about 36% of the world's production.

About 50% of the country's lumber.

About 45% of the country's lead.

About 93% of the country's sweet potatoes.

About 80% of the country's rice.

About 70% of the country's grains sorghums or Kafirs.

About 61% of the country's cabbage.

The South has 37% of the country's swine, about 33% of the country's cattle, and about 30% of the country's milch cows.

Canada's Automobile Exports Grow

IT is predicted that within a decade Canada will be the greatest automobile exporting country in the world. A writer in the Canadian Bankers' Association's *Journal* points out that several of the world's largest producers of motor vehicles are now handling all their export business from the Dominion, while the largest individual manufacturer of motor cars has for some years filled all orders for the British Dominions and possessions from his plant on the Canadian side of the St. Clair River.

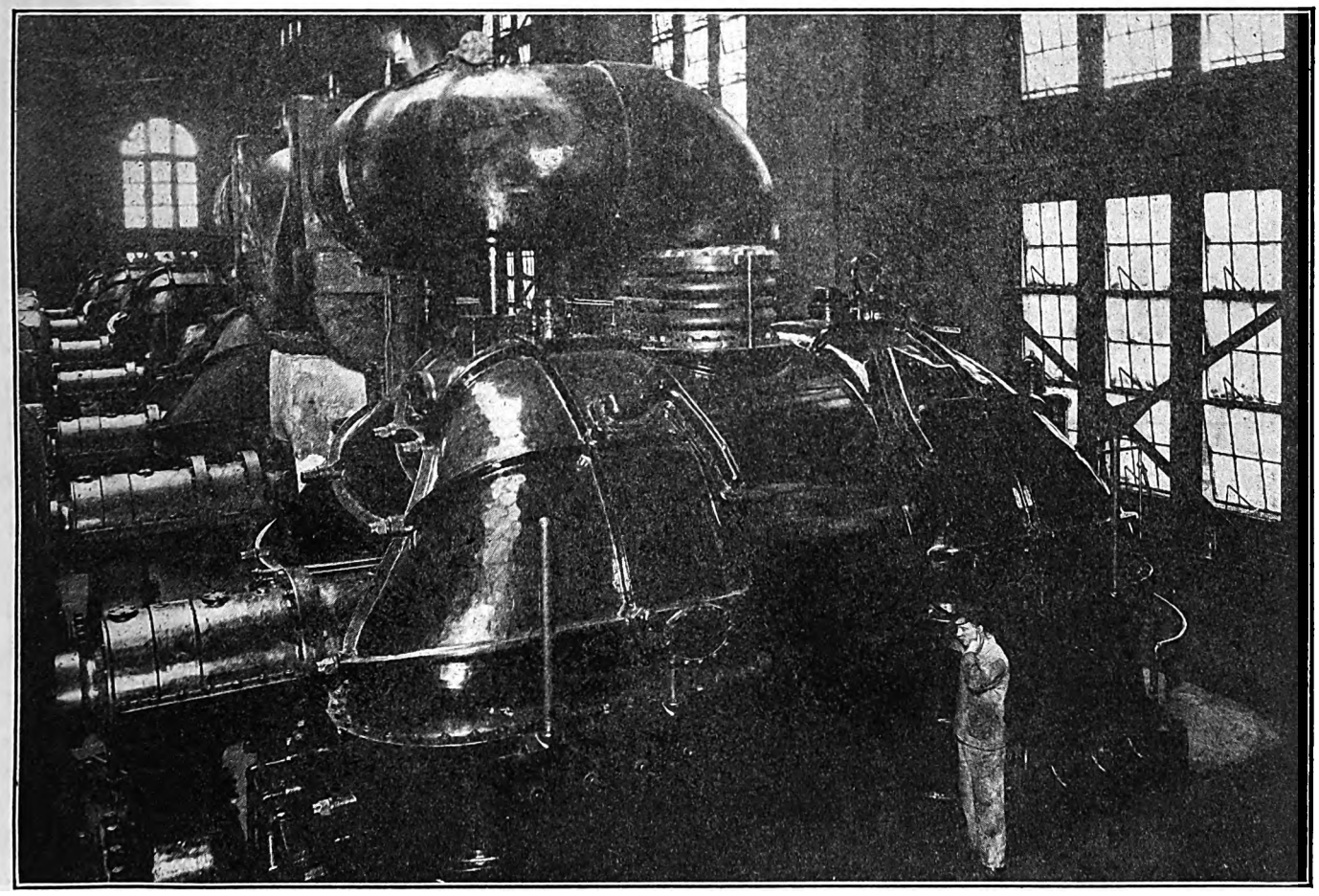
The progress of the automobile export business in Canada has been comparable to the remarkable development which has taken place in the home market. With a population of about 9,000,000, Canada owns and operates over 400,000 automobiles and trucks. A decade has witnessed an increase in automobile ownership of twentyfold. While such a phenomenal advance is not to be expected again, continuous replacement of motor vehicles is assured. Within the next ten years, Canada will offer a home market for more than 500,000 motor vehicles for replacement purposes only. In that time it is believed the market will expand its demand from 50,000 to 60,000 motor vehicles per annum, which it now offers, to beyond 100,000 motor vehicles.

In the automobile manufacturing concerns alone, employment is given to about 8000 wage earners and 1200 or 1500 salaried hands. Wages paid total about $10,000,000 and salaries about $3,000,000. Manufacturers of automobile supplies pay salaries amounting to nearly $1,000,000 every year and wages of more than $5,000,000.

In many cases, however, automobiles are assembled rather than manufactured by the Canadian companies sponsoring them so as the volume of automobiles imported falls off, in proportion to sales of cars made in Canada, the volume of automobile parts imported manifests a decided increase.

The most recent information compiled about the Canadian automobile industry is that contained in a preliminary report on the automobile industry in Canada for 1920, which has just been published by the Dominion Bureau of Statistics. It shows that $67,157,045 worth of material was consumed by that industry during the year 1920. The largest individual item was $12,972,801 for automobile bodies, the next largest $8,810,486 for automobile engines. In raw materials the principal item of consumption was steel, figured at $1,006,848. Iron and steel castings consumed are stated at $1,763,812 and $1,875,358 respectively.

The Biggest Turbine in the World



© Underwood & Underwood

Low-pressure cylinder of the 100,000-horsepower Westinghouse triple compound turbine in the Interborough Rapid Transit power-house in East 74th Street, New York City. This engine is far less spectacular in appearance than the old 7500-horsepower engines in the same room, but it has massiveness that bespeaks tremendous power. The motion of turbine is rotary and as there are no heavy parts to be stopped and started at the end of every stroke, as in a reciprocating engine, very high speeds are permissible, thus making it possible to develop great power from a comparatively small machine. The speed of this is 1500 revolutions a minute. Superheated steam enters the high-pressure element at 205 lbs. pressure and, dividing into two portions, is exhausted into low-pressure elements of 15 lbs. each. From the low-pressure elements it goes into condensers in which a 29-in. vacuum is maintained; 826,000 lbs. of steam are used per hour for a maximum load, and the water rate is below 11 lbs. of steam per kilowatt hour.

Who Saves the Most Money?

IT is a well-known fact that savings bank deposits form a fairly accurate indication of the stability and prosperity of any section of our country. Therefore, particular interest attaches to the recent statement issued by the American Bankers Association through the savings bank division regarding per capita savings by sections of the country.

According to this study just completed, our total savings deposits amount to $16,500,000. This total is in conflict with the estimates recently issued by a United States Government bureau, placing the total savings for the country at $27,000,000,000, a figure which is based on mutual savings bank deposits and outstanding United States bonds.

"The present figure of sixteen and a half billions includes savings deposits, certificates of deposit of thirty days and over, and postal savings, for which the most complete data yet compiled has been obtained through a special nation-wide inquiry made in co-operation with Comptroller of the Currency Crissinger, the supervisors of state banks, and individual bankers. . . .

"The variety of methods under which savings are deposited offers further proof of the fact that the vast bulk of the people's savings is entirely beyond the control of any effective grouping of financiers which can be conceived."

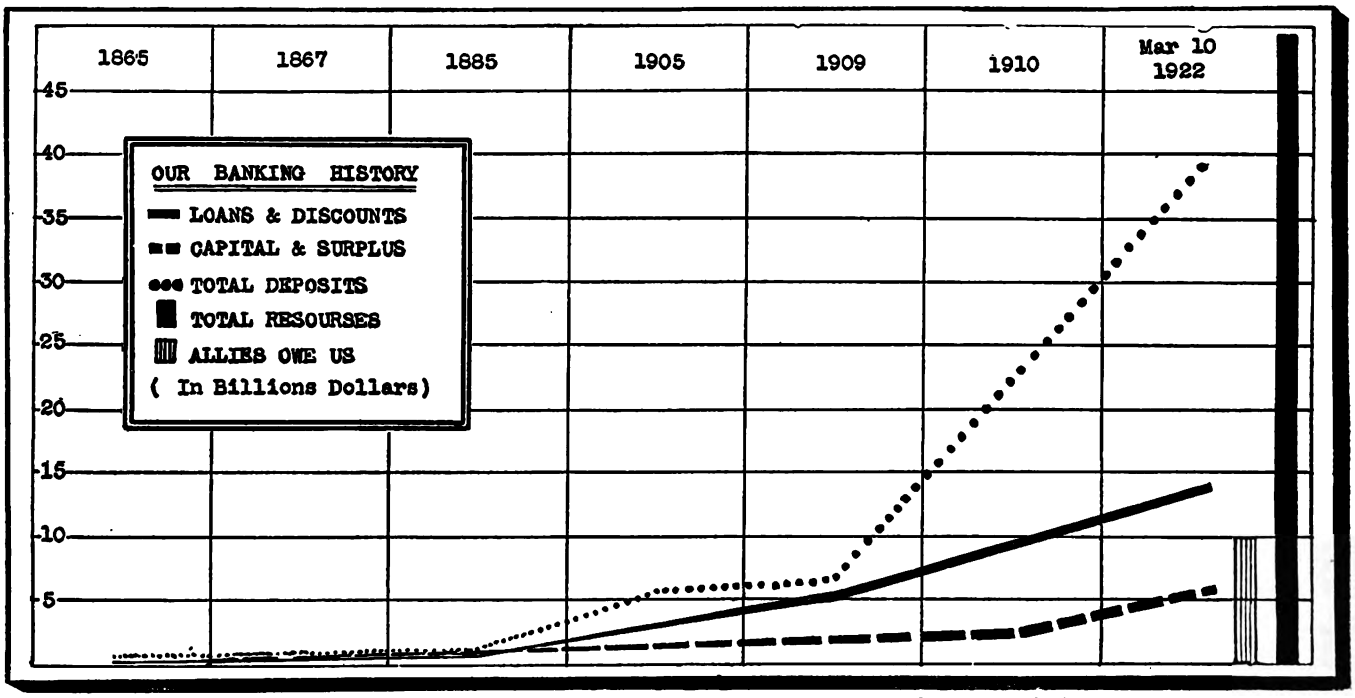
It will be noticed that the per capita savings in the New England States, which is almost entirely a manufacturing section, is by far the highest of any part of the country. This agrees fairly well with the figures on retail sales recently, indicating that sales are holding up well through the Middle Atlantic and New England States.

This, too, in spite of the fact that a large portion of the saving population in New England has been directly affected by the textile strike.

The per capita savings in the Southern States amount to but little more than one-ninth of the New England deposits, which also agrees with the fact that retail sales in the South have been noticeably slow of late. Naturally, the number of negroes in the South brings this figure down far below the level which would be indicated if only whites were included in the count.

A noticeable point is a the large proportion of certificates of deposit and postal savings in the East Central States and the unusually low percentage of certificates of deposit in the New England States.

Manufacturers who are planning aggressive sales campaigns to the consumer, would do well to consider these figures when laying out quotas and advertising appropriations.



Highlights in our banking history since 1865, showing the tremendous increase of total deposits and the tower of strength, "total resources."—*(Financial World.)*

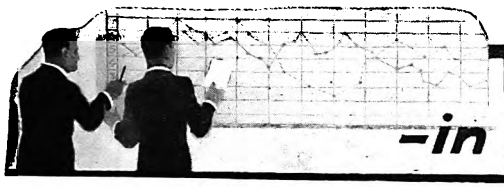
A brief summary of the compilation is as follows:

Savings Deposits in Banks of United States as of June 30, 1921. Compiled by American Bankers' Association, Savings Bank Division.

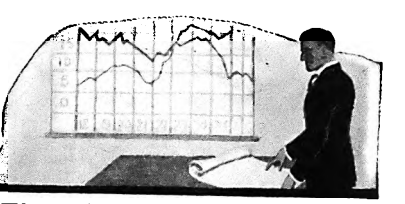
State Groups	Savings Deposits (Thousands)	Certificates of Deposit 30 days and over (Thousands)	Postal Savings (Thousands)	Total (Thousands)	Per Capita Savings Deposit, 1920 Census
New England....	$2,731,586	$15,549	$2,808	$2,749,943	$371
Middle Atlantic..	5,747,122	263,691	43,830	6,054,643	247
Southern	890,324	411,246	1,702	1,303,272	45
East Central.....	3,087,719	1,219,806	9,567	4,317,092	145
West Central....	206,107	532,058	1,553	739,718	89
Pacific	1,353,029	96,046	4,852	1,453,927	212
Total	$14,015,877	$2,538,396	$64,312	$16,618,595	$165

Artificial Plants

A VERY ingenious process has been invented in Germany for procuring exact reproductions of plants of various kinds and sizes for decorating streets, gardens, etc. The method may be called a ceramic photographing of the plant. Clay and alcohol are mixed until a liquid of milk-like consistency is obtained. When the plant is dipped into this mixture, the fine particles adhere to it closely and on being removed from the dipping solution, these particles dry almost immediately. The addition of a dilute solution of resin serves to cause the particles of clay to stick even more tightly to the plant. The organic matter of the plant is then burned off and there remains an exact replica of it in hard white burned clay. Fine effects can be secured and these reproductions make beautiful decorations.



THE TREND
—in facts and figures



Basic Commodity Prices

(Minimum, at New York, unless otherwise specified)

	Week Ending July 29	Week Ending July 22	Year Ago
Aluminum, pig (ton lots), lb.	.17	.17	.22
Antimony, ordinary, lb.	.0575	.0575	.05125
Brick, Hudson R., per M.	21.00	21.00	15.00
Cement, Portland, bbl.	1.70	1.70	2.15
Copper, Electrolytic, lb.	.13875	.14	.12
Cotton, spot, Mid. Upl., lb.	.217	.2195	...
Hides, Chic. Pack., No. 1, lb.	.19	.185	.14
Lead, N. Y., lb.	.057	.057	.0435
Petroleum, cr., at well, bbl.	3.00	3.00	2.25
Pig iron, Bessemer, Pgh., ton.	26.77	26.77	22.46
Pine, roofers 6 in., M. ft.	31.00	31.00	26.00
Rubber, Up River, fine, lb.	.19	.19	.16
Silks, Sinshui, No. 1, lb.	7.35	7.40	5.80
Spelter, N. Y., lb.	.0635	.061	.045
Steel Billets, Bess., Phg., ton.	35.00	35.00	30.00
Tin, N. Y., lb.	.33	.3175	.2625
Wool, Dom., ½ blood com., lb.	.50	.50	.29

Wholesale Commodity Prices

Coal—			
Bit., ¾ in., lump, net ton	...	...	...
Anthracite, egg, net ton	...	...	...
Coke, furnace, net ton	14.00	11.00	2.75
Cotton Goods—			
Brown Sheetings, Std. yd.	.13	.13	.0925
Standard Prints, yd.	.1025	.1025	.11
Print Cloths, 38½ in., 64x60, yd.	.08625	.0875	.06625
Drugs and Chemicals—			
Alcohol, ethyl, form 5, gal.	.30	.30	.30
Alcohol, wood, 95%, gal.	.57	.57	.85
Alum, lump, lb.	.0325	.0375	.0375
Bleaching Powder, over 34%, 100 lbs.	1.60	1.60	2.15
Borax, crystal, in bbl., lb.	.06	.06	.06
Caustic Soda, 76%, 100 lbs.	3.65	3.65	4.00
Lime, factory, 200-lb. bbl.	1.90	1.90	...
Nitric Acid, 42°, lb.	.065	.065	.07
Saltpeter, crystal, 100 lbs.	.0775	.0775	.1075
Soda Ash, 58% light, 100 lbs.	1.75	1.75	2.00
Sulphuric Acid, 60%, 100 lbs.	.50	.50	.60
Flour—			
Spring Pat., 196 lbs.	7.35	7.60	8.65
Winter, soft str't, 100 lbs.	5.40	5.50	6.00
Grains—			
Wheat, No. 2 Red, bu.	1.295	1.29	1.3875
Corn, No. 2 Yellow, bu.	.8275	.83125	.8475
Oats, No. 3 White, bu.	.46	.46	.51
Rye, No. 2, bu.	.925	.9525	1.335
Barley, malting, bu.	.75	.75	.80
Hay, No. 1, 100 lbs.	1.50	1.55	1.50
Straw, lg., rye, No. 2, 100 lbs.	1.25	1.80	1.10
Hides—			
Cows, heavy native, lb.	.19	.175	.14
Country, No. 1 steers, lb.	.14	.14	.08
Iron and Steel—			
Basic, Valley furnace, ton.	24.00	24.00	19.50
Steel bars, Pittsburgh, 100 lbs.	1.70	1.70	1.75
Beams, Pittsburgh, 100 lbs.	1.70	1.70	1.85
Galvanized Sheets, No. 28, Pittsburgh, 100 lbs.	4.15	4.15	4.00
Leather—			
Hemlock, sole, No. 1, lb.	.29	.29	.28
Scoured oak backs, No. 1, lb.	.50	.45	.55
Lumber—			
FAS Qtd. Wh. Oak, 4/4" M. ft.	145.00	145.00	145.00
Tonawanda Wh. Pine No. 1 barn 1x4", M. ft.	82.00	82.00	90.00
Adirondack Spruce, 2x4", M. ft.	38.00	38.00	48.00
No. 1 Com. Y. Pine Bds., 1x4", M. ft.	44.75	44.75	37.00
Oils—			
Coconut, spot N. Y., lb.	.085	.085	.10
Crude, tks, f.o.b. coast, lb.	.07	.06875	.08
China Wood, bbls., spot, lb.	.1225	.1275	.15
Cottonseed, lb.	.11	.11	.08
Linseed, city, raw, gal.	.93	.94	.81
Paraffine wax, ref., 125 m. p., lb.	.035	.035	.035
Turpentine, gal.	1.21	1.22	.58
Paints—			
White Lead, in oil, lb.	.125	.1250	.13
White Lead, dry, lb.	.0725	.0725	.075
Zinc, Amer., lb.	.075	.075	.075
Paper—			
News roll, 100 lbs.	3.75	3.75	4.75
Book SS. & C., lb.	.075	.0625	.0775
Wood Pulp, ton.	75.00	75.00	80.00
Sugar—			
Cent. 96°, 100 lbs.	5.36	5.31	4.50
Fine Gran., in bbls., 100 lbs.	6.90	6.80	5.75
Wool—			
Boston Aver. 98 quot., lb.	.7398	.7398	.3974
Stand. Clay Wor., 16-oz., yd.	3.00	3.00	2.85
Fancy Cassimere, 13-oz., yd.	2.45	2.45	2.25
Serge, 36", Wor., yd.	.52	.52	.52
Broadcloth, 54", yd.	2.75	2.75	2.50
Cottonwarp serge, 36", yd.	.45	.45	.45

Financial

Bank Clearings	Week Ending July 29	Week Ending July 22	Year Ago
New York	$4,009,633,510	$4,387,161,725	$3,301,662,132
Chicago	503,280,855	536,608,510	462,662,040
Entire Country	7,150,000,000	7,847,000,000	6,070,000,000
Increase or Decr. (Per cent of total from preceding year)	+17.8%	+24.08%	—20.9%

Cost of Money—New York	Week End. July 29	Week End. July 22	Year to Date	Year Ago
Call Loans	4@3	5@3	6@2¾	5@3½
Time Loans (60-90 days)	4@3¾	4@3¾	5@3½	6@5½
Six Months	4@3¾	4½@4	5@3¾	6@5½
Com. Discount, 4-6mos.	4¼@4	4¼@4	5@4	6½@6

Financial Transactions	Week Ending July 29	Week Ending July 22	Year Ago
Stock Sales, shares	3,962,919	3,576,391	2,213,969
Aver. Price, 25 Railroads	65.66 h. 62.90 l.	64.58 h. 63.46 l.	54.70 h. 53.94 l.
Aver. Price, 25 Industrials	101.94 h. 98.71 l.	102 h. 98.47 l.	73.67 h. 72.31 l.
Sales of Bonds, Par Value	$63,699,350	$76,172,700	$65,565,900
Aver. Price, 40 Bonds	81.17 h. 80.96 l.	81.22 h. 80.96 l.	70.95 h. 70.05 l.
Average Net Yield, 10 High-Grade Bonds	4.450%	4.430%	5.275%
New Security Issues	$36,665,000	$42,652,300	$23,250,000

Business Failures	Week End. July 27	Week End. July 20	Year Ago
Number	407	444	342
Liabilities	June, 1922 $38,242,450	May, 1922 $44,402,886	June, 1921 $34,639,375

Industrial

Building Permits	June, 1922	May, 1922	June, 1921
	$258,674,449*	$228,875,188†	$127,671,278*

*141 cities. †156 cities.

Idle Freight Cars	June 30, 1922	June 15, 1922	May 24, 1922
Number	405,185	442,253	511,282
Car Loadings	**July 15, 1922**	**July 1, 1922**	**June 10, 1922**
Number	860,907	876,896	846,002
Steel and Iron Barometer	**June 30, 1922**	**May 31, 1922**	**June 30, 1921**
U. S. Steel Orders (tons)	5,635,531	5,254,228	5,117,868
Daily Pig Iron (Prod.) tons	78,701	74,409	35,494
Monthly Pig Iron (Prod.) tons	2,361,028*	2,306,679†	1,064,383*

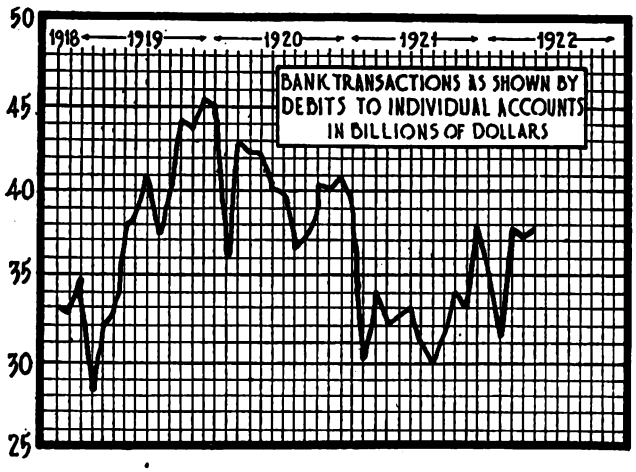
*Month of June. †Month of May.

Foreign Trade	June, 1922	May, 1922	June, 1921
Exports	$334,000,000	$308,000,000	$336,958,412
Imports	260,000,000	254,000,000	185,679,893



Money Easing Up

TWO facts point to a general easing up of money conditions in the United States. The first is the resumption of gold imports during the last month which will have the secondary effect of strengthening British exchange since most of the gold is coming from the African possessions of the British Empire. The second factor is the further decline in the rediscount rate of the Bank of England. It does not seem likely that this second factor will immediately influence the action of the governing board of our Federal Reserve Banks and yet it can not but have a strong influence on money conditions. It is fairly certain that there will be no rise in



Bank transactions as shown by debits to individual accounts, in billions of dollars.—*(Magazine of Wall Street).*

the rediscount rates for some months to come, whether a further drop is realized or not.

Mark Still Drops

THE recent fall of the German mark to a valuation of less than 1/6 of a cent was neither surprising nor unexpected. In fact it is fairly well understood that industrial elements in Germany are opposed to any immediate strengthening of the mark on the grounds that it would lead to immediate cessation of industrial activity and result in throwing hundreds of thousands of employees out of work.

All indications point however, to a general acceptance, even in French circles, of the fact that the reparation burden is too crushing and that a moratorium should be granted.

Rails Show Strength

RAIL stocks have shown a surprising strength in view of the none too favorable strike news during the last fortnight. Rail bonds have shown pronounced strength during the last month after a weakness in May and June. Rail stocks continue to play a prominent part in tradings on the exchange. This is no doubt due to a recognition of the fact that the railroads are likely to come out of the strike with reduced wage scales sufficient to increase their earning capacity strongly enough to be reflected in dividends. Should the strike continue for any great length of time there will probably be a reaction in these issues as a continuation of the present trouble would mean a distinct cut in earnings for the present quarter, at least.

Market Nervous

THE market has been in a highly nervous condition recently, chiefly on account of the status of the two strikes which are affecting all industry so greatly, and also on account of the operation of professional pools. Then, too, the continued indecision with regard to action on the tariff is keeping business up in the air. For the most part traders have discounted the influence of the increase in business which is certain to come this fall, unless a prolongation of the coal strike slows things down. Many statisticians believe that the turning point for bonds is not far off, while industrial and rail stocks are thought by most observers to be good for a long period of advances, at least until the first of the year.

The Ryan Failure

HOW far should our banks assist speculators on the exchange to gamble with other people's money? That is the question that has arisen in the financial district again—this time the cause of the discussion being Allan A. Ryan's failure for $18,000,000. He has long been known as one of the boldest speculators in the Street and was finally forced out of the Exchange. The Guarantee Trust Bank loaned him $4,000,000, the Chase National Bank gave him $3,456,429. and the Mechanics and Metals National Bank handed over to him $1,402,963 with which to gamble. All these loans were based on some sort of collateral, but whether the collateral was sufficient to have been expected in the case of a loan to the average business man who needed the money for increasing his production may be gathered from the fact that the collateral for the loan from the Chase National Bank is reported to have shrunk to $667,756, or less than 20% of the amount. It is not a question of judgment in regard to accepting collateral, but a question of loaning large sums of money to any individual generally known as a plunger. *The Nation* remarks in this regard:

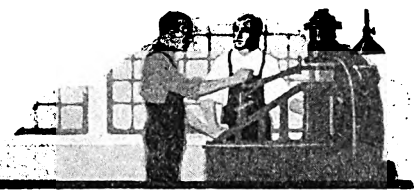
"When should reputable institutions give any support to such a man? Some time ago, when the farmers were unable to get the loans they needed, the charge was openly made, by John Skelton Williams if we recall aright, that the Federal Reserve system was lending its funds to banks in New York which were in turn lending them to stock speculators. The charge was indignantly denied. Now the Ryan failure would seem to lend some color to at least part of the charge. Perhaps it will hasten the day when our strongest institutions will exercise a keener censorship over their Wall Street loans, eschew wholesale speculators, and interest themselves in the smaller and more reputable business men who so often find it extremely difficult to get small loans while the Allan Ryans go off with a cool four millions from a single trust company."

Liberty Bonds Improve

THE recent advances in U. S. war loan bonds have been somewhat puzzling. In many quarters there has been an attempt to explain the rise on the grounds that the Government itself has been buying. However, purchases of Liberty bonds at substantial premiums would hardly be in accordance with the policy which Secretary Mellon has thus far followed. Nor would it harmonize well with Section 6 of the Victory Liberty Loan act which in establishing the cumulative sinking fund provides that "The average cost of the bonds or notes purchased shall not exceed par and accrued interest."



LABOR



Million and a Quarter Idle Now

ACCORDING to the *Industrial News Survey* of the National Industrial Conference Board, there has been little change in the industrial situation recently. With the railroad, coal mining and textile disputes still unsettled, a depressing effect on business generally is evident. Altogether over 1,260,000 persons are voluntarily idle through strikes and since the beginning of July, 63,000,000 man-hours of work have been lost each week. Estimating the average wage of labor at 50 cents an hour, the wage loss alone since the first of the month has been approximately $94,500,000 and is proceeding at the rate of over $5,000,000 a day. It is pointed out that this has resulted in a serious contraction in purchasing power, which is likely to affect future employment and general business conditions.

Employment in Basic Industries Increasing

THE United States Department of Labor reports that a shortage of labor exists in 22 out of 37 states covered in a recent survey. Eleven states report supply and demand about equal and in four there is a surplus of labor due to the mine and railroad strikes. The Bureau of Labor Statistics reports that of 12 representative manufacturing industries eight showed increases and four decreases in the number of persons employed in June, 1922, compared with June, 1921. Industries which showed increased employment were iron and steel, 32%; car building and repairing, 30.5%; automobiles, 21.2%; paper making 19.1%; hosiery and underwear, 16.8%; leather, 14.5%; men's clothing, 1.8%; and boots and shoes, 1.0%. Decreases were shown by cotton manufacturing, 25.1%; silk, 19.3%; cotton finishing, 14.8%; cigar manufacture, 8%.

Textile Strike Ending

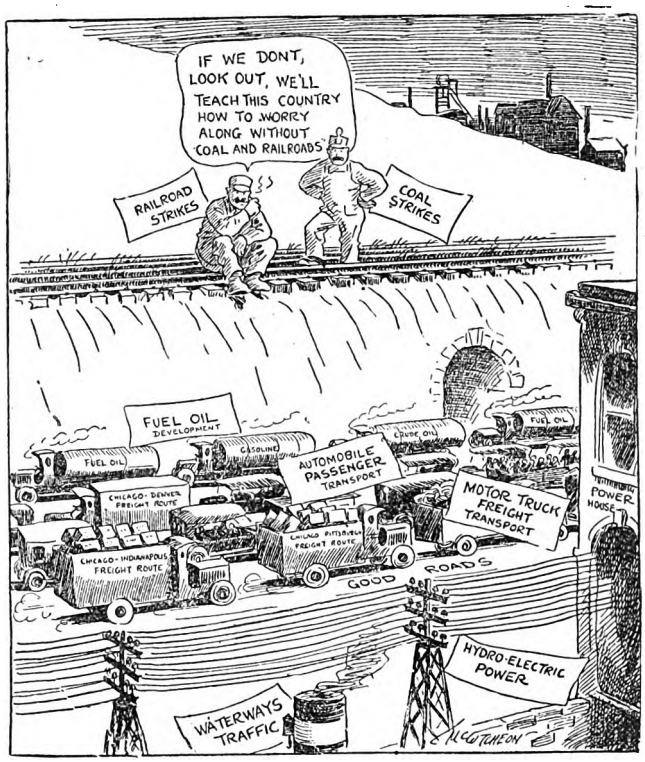
RECENT reports from New England appear to indicate that the textile strike in the Rhode Island mills is nearing an end, and although strikes are still in progress in New Hampshire and Massachusetts, it is believed that the continued operation of the mills in Rhode Island will result in strikers in other sections returning to work.

According to the *Daily News Record,* between 60% and 70% of the operatives who went on strike in Rhode Island have returned to work. Out of 35 mills affected by the strike there are only four that are not running.

Building Trade Disputes Settled

A SETTLEMENT of the disputes in the Boston building trade appears to have been reached. The Building Trades Employers' Association and the United Building Trades Council have signed an agreement which is expected to be ratified by the unions. Wages are to be $1.00 an hour to the majority of the skilled men and $1.12½ to bricklayers, plasterers and stone-masons. The lathers are on strike to get a five-day week and $1.12½ an hour. The five and a half day week is the standard for such trades as have a different trade agreement. The carpenters, painters, and plasterers have a five-day week.

Bridge carpenters and shop and mill men are to receive 90 cents an hour. Common labor is to be paid 55 cents an hour, and 60 cents for the better class. Other wages are as follows: asbestos workers, $1.00; asbestos improvers, 70 cents; carpet and linoleum layers, $1.00; cement and asphalt finishers, $1.00; terazzo and mosaic workers, $1.00; electrical workers, fitters and hangers, $1.00; electric helpers, 62½ cents; gas fitters, $1.00; glaziers on buildings, $1.00; hardwood finishers on buildings, $1.00; hoisting engineers, $1.00 or $44.00 for a 44-hour week; steam shovel engineers, $60.00 for a 48-hour week.



(Chicago Tribune)

What we may expect if rail and coal strikes continue



(Chicago Tribune)

The head will feel so good when he stops



IN THE MANAGER'S OFFICE



A Traffic Manager's Duties

SUCCESSFUL competition requires the constant vigilance of specialists on traffic conditions. Arthur D. Lowe, in *Lefax,* lists the general duties of the traffic manager as follows: (1) To protect the company from loss. This may be accomplished by conforming shipments to rate and classification requirements, by the payment of only legal rates, by the elimination of wastes in distribution of the product, by careful computation to guard against errors, reduction in the amount of delays and the collection of just claims. (2) To effect economies by reducing costs of shipping, loading, trucking, etc., by means of proper routing of shipments, the exercise of care in packing and loading and the charting of truck movements both within and outside the plant. (3) To furnish adequate information and cooperation at all times to other departments, branch offices, agents and traveling salesmen. (4) To establish cordial relations with carriers by cooperation and by building up a reputation for the firm as one which believes in fair dealing.

While the duties listed by no means comprise all the traffic manager's responsibilities, they constitute in general the more important of these responsibilities.

Will Engineering Counsel Pay?

THE survey of the relations between manufacturers and industrial engineers conducted by *Factory* is designed to aid the executive in deciding whether industrial engineering counsel will be profitable in the management of his particular plant. The activities which an industrial engineer is prepared to undertake for the manufacturer are: (1) To devise and install cost finding methods; (2) To devise and install production planning methods; (3) To make time studies and set standards of production; (4) To devise and install wage incentive methods of paying workers; (5) To rearrange machines so as to avoid needless delays in handling; (6) To recommend labor saving devices where warranted; (7) To eliminate material wastes; (8) To study the organization in an effort to assign to each man the work for which he is best fitted; (9) To devise the best way for handling relations with employees; (10) To help lay out policies which take into account the manufacturing, marketing and financial problems of the business.

The point which many manufacturers raise is the value of an outsider for work with which the manufacturer is presumably in closer touch. The answer is that the engineer deals with specific functions of business and he has presumably made an intensive study of the problems presented by those functions. From having met the problem before, he knows the answer at once, while the manufacturer or one of his men would have to spend weeks solving it.

It is not only in designing new methods to meet problems that the outsider is of value. There is a knack in installing them that makes a great difference in the speed with which they can be installed and in the results that they will give. The fresh point of view of the outsider is also of real value. The manufacturer has by long contact become accustomed to his own methods to such an extent that he accepts them without question as right. One other advantage which the outsider has is prestige. The fact that he is an outsider gets him a hearing where the efforts of an employee whom everyone knew would be considered lightly.

Are poorly managed concerns the only ones which can benefit by employing industrial engineers? Investigation shows that the managements of poorly run plants seldom realize that the possibility of improvement exists. It is, as a rule, the leaders in their industry who are constantly on the search for better methods.

All of the manufacturers who have had first-hand experience with industrial engineers agree that success or failure depends most on choosing the right engineers. One choice lies between employing the free lance individual who does the work himself or the firm of engineers with a number of engineers on its staff. The larger firms of engineers possess the advantage that they are nearly sure to have the widest experience and to have broad knowledge of business methods and conditions in addition to the technical knowledge of detailed methods. In brief, the manufacturer should use the same good judgment in picking outside engineering counsel that he would use in choosing a doctor or a lawyer. Precautions must be taken against the charlatans and the quacks with their cure-alls or secret magic. The engineer does not work with magic; he works with brains and experience.

The Why of Cost Accounting

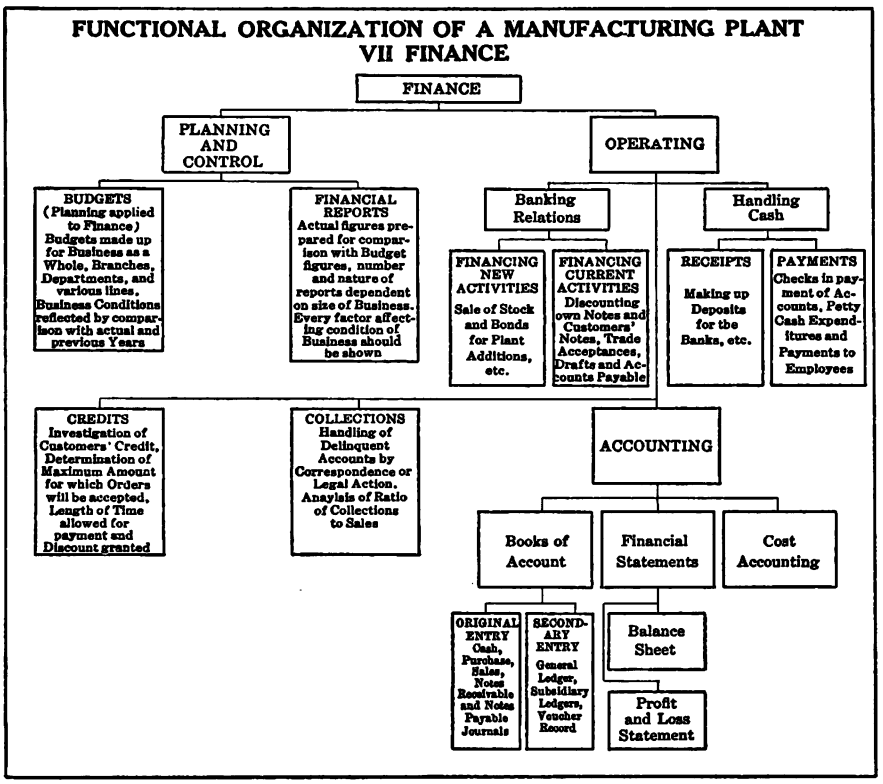
THE purpose and value of cost accounting is described in a recent publication of the Chamber of Commerce of the United States. The problems presented in labor, materials, production costs, and keen competition have made it necessary for the manufacturer to know the cost of his product in order that his business may continue to be a profitable one and earn the margin of profit desired. There is a definite dividing line between profit and loss and the location of this dividing line can be and should be accurately determined.

Records of costs are valuable in themselves, yet it is the detailed information which they contain, available for ready reference, which is of the utmost value. Accurate information regarding the various elements which go to make up costs automatically eliminates arbitrary, empirical, or guess costs which prevail to a surprising degree among many manufacturers. The cost system brings to light imperfect internal conditions and suggests correction.

How to Reduce Prices

STEADY profits come from narrow margins, says F. C. Rand in *System.* The smaller the profit consistent with safety, the less expensive the customer finds the service, the more that service is in demand and the more surely are profits steady. The policy of holding to a narrow margin of profit is not easy to apply in the day-to-day variations of actual commercial conditions. One must be continually alert in anticipating the conditions of a few months in advance and in foreseeing the reactions they will bring about from consumers and dealers.

The minute the dealer ceases doing business, he ceases placing orders. Not only does the manufacturer wish him to continue his sales, he must know that he is going to do so. Economical manufacturing depends upon continuous operation on large volumes of goods, scheduled in advance; and production can be scheduled only by grouping into quantities the advance orders which are not likely to be cancelled. The only means of insuring the dealer a steadily maintained rate of fast turnover and the manufacturer a constant volume of business is low percentage of profit—based on costs, not on speculation or on opinions of what the market will bear.



Functions of a Typical Industrial Plant

This chart is seventh in a series based to a large extent on lectures given at the Bureau of Personnel Administration by Warren D. Bruner

In a lowering market, prices must not only be cut, but must be cut fast enough to be of service to the dealer. Reductions in price should not be based solely on the price of raw materials. Some of them can be brought about by improved management methods or policies which will result in lower costs. One of these profitable policies, described by Mr. Rand, was the refusal to confuse costs at various stages of progress from raw material to warehouse by taking a theoretical profit on each transfer. Operations are conducted as one unit and one profit taken at the end. Raw materials and supplies are sold to factory units at standard average prices but this is merely a budget method to measure interior economy. Dividing the costs on the budget helps to reduce costs by making possible a comparison of details. But including theoretical profits as costs only leads to confusion.

Low profits in themselves help lower overhead, for they make possible low prices which increase the sales volume. Low prices make it easier to get business and reduce sales expense.

Cost keeping brings to light inefficiencies in system by calling attention to the cost of its operation and points out equipment that has become inadequate by showing an excessive cost of product coming therefrom; it points out employees who are below the standard required and permits of performances being kept within certain limits by watching the accumulation of costs.

It is not sufficient that executives simply know that expenditures are excessive; they should be supplied with information to determine exactly where these excessive expenditures occur and take action. Definite responsibility for expenditures as well as the authortiy to make the expenditures should be fixed by an adequate system of cost accounting.

Overhead, or Burden, consists of expense items which cannot be directly attributed to some particular product. Overhead being variable, as related to output, and forming a material portion of a plant's expense, it is necessary that rigid control be kept over these accounts. Guessing or estimating amounts of overhead, as well as arbitrary distribution without a sound basis, is uncertain and leads to unexpected results. Detailed cost reports should form the basis of overhead distribution.

The worst competition which any plant has is largely from those who do not know what it costs them to produce and do business. When normal production returns, competition will force closer margins and costs must then be known.

Where a variety of articles are manufactured in a single plant a cost system offers the only opportunity for determining positively those lines which are not profitable. Where a single article is manufactured timely information regarding costs can forestall a calamity.

A practical, usable cost system should not be complex, but lean toward simplicity. Neither should it require an investment out of proportion to the benefits to be acquired. Technical accuracy in costs, especially in lines involving minute operations, is not altogether desirable or necessary, but costs commercially accurate can always be obtained.

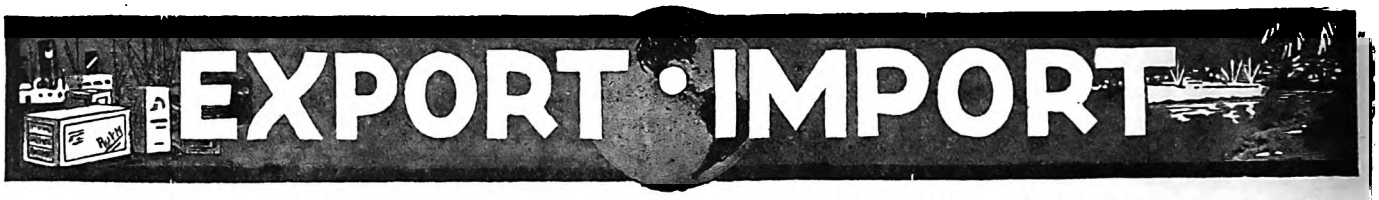
In brief, a cost system insures profits, provides an adequate method of control, increases production, checks variation from standard practice, helps control overhead, promotes intelligent competition, determines unprofitable lines and is an investment.

What to Do with Overhead

THE crux of any cost finding method is its treatment of expense distribution, or overhead. Robert S. Denham, in *Industrial Management,* outlines the principles and practice underlying the problem of expense distribution. The principle of expense grouping is that indirect expenses may be grouped for simultaneous distribution only when their benefits are measured by a common unit and their beneficiaries participate in identical ratios. To make this clearer some primary examples are given of the method of charging items of expense: building expenses—area of used space; equipment expenses—replacement value of equipment; power expenses—horsepower hours; light and toilet expenses—personal hours, or payroll hours; factory administration expenses—extended values; selling expenses—extended values at cost, when sold; packing and local delivery—to be determined by circumstances; raw stock expenses—frequently applied on basis of cost of material but requires special attention; finished stock expenses—applied by percentage to stock carried for customers, or through selling expense; foreman's wages—payroll hours of divisions supervised by each.

What to Do With Depreciation

SIX practical suggestions for dealing with depreciation are given by the fabricated production department of the Chamber of Commerce of the United States. (1) Charge depreciation, so that profits may be real, and not in fact a distribution of capital. (2) Charge depreciation against current operations that costs may be complete. (3) Factory cooperation will minimize unjustified depreciation. (4) Make proper allowance for obsolescence. It is often the determining factor in depreciation. (5) Avoid rule-of-thumb rates of depreciation. Frequent inspections, adequate records and personal experience checked by that of the industry are the best guides. (6) Record depreciation with reference to specific items.



Textiles

TEXTILES and textile manufactures comprise over 40% of the annual imports into Asia Minor through Smyrna. Gray cotton sheetings, gray and blue drills, bright-colored calicoes, ginghams, flannelettes, voiles, and zephyrs, cotton knit goods, coarse worsteds, and bright colored silks are much in demand. Before the war the only textile manufacture that was imported from this country was unbleached cotton piece goods, but since the armistice all kinds of American textiles have found a ready market. It should be remembered, however, that the American textile producer must give consideration to the question of local preferences and not attempt to market in Asia Minor textiles similar in design, color and finish to those sold in the United States. Textiles of good quality but poor finish are not acceptable to the Asiatic consumer. He requires material of cheap quality, with good finish, bright colors and Oriental patterns. The need of adapting exports to the tastes of the Smyrna buyer is more important than the question of price.

It is expected that large quantities of yarn and sewing cottons as well as cotton goods will be required in Rumania during the course of the current year.

Artificial leather of American manufacture is very popular in Japan. Official statistics of Japan's imports of artificial leather during the last three years show that the United States supplied the largest percentage.

A good market for blankets may be found in Venezuela. The kind most wanted are cheap cotton blankets, with bright colored borders.

Lumber

AN increasing demand for American furniture is evident in Mexico. Although a great deal of European furniture was formerly sold in this market, American manufacturers have encountered little competition since the last revolution. Mexicans are not interested in changes in styles of furniture, but prefer large pieces elaborately carved and equipped with mirrors wherever possible.

The best grades of American hardwoods have acquired an excellent reputation in Greece, although, on account of the high prices due to the exchange, their use is limited to certain purposes in house construction.

There are both present and future prospects for selling American railway ties in China. Steel and concrete sleepers are used, but the demand is chiefly for wooden ties. The usual dimensions for railway ties are 8 feet by 9 feet 6 inches. Bridge ties are 10 feet by 9 by 8 inches. Very few creosoted ties are used in China.

Automotive

PROSPECTS for the sale of motor trucks and passenger cars in South Africa are much brighter than they have been at any time since the middle of 1920.

Although Japan is still said to be in the bicycle stage of its development, imports of automobiles have increased rapidly in the last few years. Tokio is the principal market for cars of medium and high price; it is estimated that it can be counted on to take 70% of all cars imported by Japan that sell above $1200 in America. It is also the principal truck market.

Machinery

A GRADUALLY improving market for well-drilling machinery equipment and supplies will be found in the Philippine Islands. Deep wells are needed throughout the islands in order to insure pure drinking water. In addition to wells drilled at the expense of the Government a large number have been drilled by individuals and by firms. It is believed this work will go forward on a larger scale in the near future.

As a result of the probable extension of the railroad between Granada and Malaga, Spain, a good market will be found in this region for agricultural implements, especially plows and harrows.

Iron and Steel

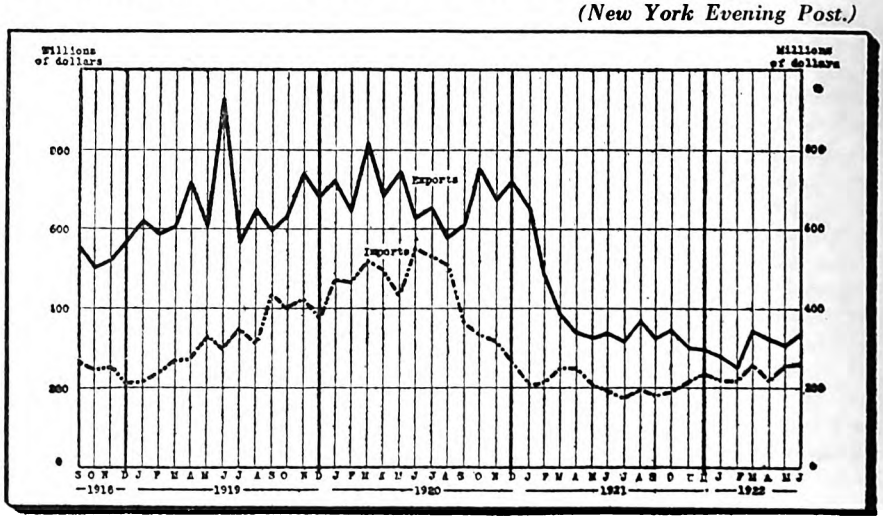
JAPAN still continues to be the leading buyer of American steel. Canada ranks next in the number of tons purchased. Other countries offering markets for iron and steel from the United States are China, Argentina, Great Britain, Mexico, Cuba, Australia, Peru, Philippine Islands, and Italy.

A market exists in Spain for iron and steel specialties, such as alloy and nickel steel, specially molded or cast pieces for tenders, railway coaches, locomotives, specialized machinery, barbed wire, steel springs and steel tools

U. S. Foreign Trade for First Half of 1922 Shows Healthy Growth

(New York Evening Post.)

Improvement in American foreign trade is shown by the figures for June. Exports for the month of $334,000,000 compare with $308,000,000 for May and were the highest since October, 1921, when the total was $343,000,000. Imports for June totaling $260,000,000 were the highest since December, 1920, when the total was $266,000,000. In May imports were $253,000,000, so that the excess of exports over imports in June rose sharply as compared with May. For the fiscal year ended June 30 exports amounted to $3,779,220,971 and imports $2,607,618,110. In the 1921 fiscal year exports were $6,516,510,033 and imports were $3,654,459,346. Although exports for the fiscal year 1922 fell off by nearly $3,000,000,000, compared with the previous year, they showed an increase of nearly $1,500,000,000 compared with the fiscal year 1914, and imports for the past year, which declined by over $1,000,000,000 as against 1921, resulted in an increase of $700,000,000 over 1914.—





How Will Your Copy Look Ten Years From Now?

THE advertising man prepares his copy and his illustrations with an eye to immediate effect—because today's insertion must bring tomorrow's sales or there would be no more advertising. Sometimes you may have stopped to consider how the material which you present for O. K. in 1922 will look to the reader who chances to leaf through the bound volumes of your media in 1932.

For example, there are reproduced on this page some of the best samples of advertising a decade ago as compared with similar copy (in many cases for the same firm) this year.

The jumbled typography, the crowded layout and the verbose copy might not pass muster with the sophisticated today but as the brain children of early members of the craft, the comparison is interesting.

Notice particularly the difference in layout. Less white space was used and the illustrative effects hardly compare with some of the highgrade work being done at present. As for the copy itself, the writers of that day had not yet exhausted their adjectives and seemed intent on using them up as soon as possible. Nor does the appeal used in the older illustrations seem logical to the modern advertising man in most cases. Extravagant claims and flamboyant statements regarding the good looks or the unusual attributes of the article played a major part at that time, even in the "best advertising families."

If your firm has been advertising for ten years, it will be interesting to dig back into your files and compare the insertions of that day with those you send to the printer now.



A ten-year change in advertisements. Can you tell at a glance the advertisements of 1912?



Automotive Industry to Benefit From Strike

ALTHOUGH a freight blockade will delay industrial recovery generally, it is believed that it will increase the sale of motor trucks. All the available rolling stock of the railroads will be needed to move coal and crops when the coal strike is ended and harvests begin. *Automotive Industries* points out that if there is acute traffic congestion the automotive industry will be peculiarly fortunate for the reason that it deals in transportation. Its finished products can be delivered overland without great difficulty, and it is also better off than many other industries with relation to supplies of raw materials. It should be remembered that it functioned with a remarkable degree of efficiency when the railroads practically collapsed in 1920 because of the shortage of rolling stock, and it can do it again, even though it will mean an increase in manufacturing costs. A freight tie up, it is believed, will be an eventual boom to the truck branch of the industry, which is now struggling back to normal. The truck makers are not only better off than the manufacturers of passenger cars in respect to inventories if they encounter trouble in securing new supplies, but it will give many of them the opportunity to dispose of the stocks they had on hand when the depression hit them.

The slowing up of production, both in motor trucks and passenger cars, is not regarded as an unmitigated evil. Dealers in various sections, especially in the industrial and mercantile centers, are beginning to worry again about the used car problem and if there were a smaller supply of new cars available it would enable them to get rid of used stocks.

British Automotive Research Goal Is Operating Economy. Somewhat contrary to American automotive research, which seeks to prove out new devices, and their application to the cars of today, together with various improvements, British research has been mainly along the line of operating economy. The work done has been largely, if not wholly, upon those new devices, plans or methods which would add to operating economy. As the work has actually proceeded, this has narrowed it down to experiments with alcohol as a fuel, with aluminum and aluminum alloys in the way of reducing car weight, and with air- and oil-cooling. The combination of air-cooling and aluminum alloys seems to appeal strongly to the average British car manufacturer, and many of this year's new cars, as well as present experimental jobs, show their principal differences over former models through the use of air cooling to lighten engine weight, and aluminum alloys to reduce car weight. M. W. BOURDON, *Automotive Industries,* 6-15-22, 3300 w. MAH.

New Woods for Bodies. The building of automobile bodies has become of such magnitude that ash and similar woods which were used almost exclusively in the beginning are not now available in sufficient quantities to meet the demand. More than supply alone is the matter of price. The great demand has forced the price up until now it is too costly to be used on ordinary bodies. This means that woods must be found which possess the necessary qualities, are available at reasonably low prices, and can be had in sufficient quantities for a long period of years. Some suggested woods include hard maple for sills and framework, yellow maple and beech when hard maple is not available, white (or gray) elm as a substitute for ash in sills, red gum for seat frames, sound chestnut and low-grade oak and hard pines for floor and running boards; for panels poplar, basswood and cottonwood compete with sheet metal. Eucalyptus is being tried, also metal interior bracing, which will permit the use of lighter wood sections, this in turn permitting the cutting of the desired wood from smaller logs. GEORGE J. MERCER, *Automotive Manufacturer,* 7-6-22, 2650 w. MAH.

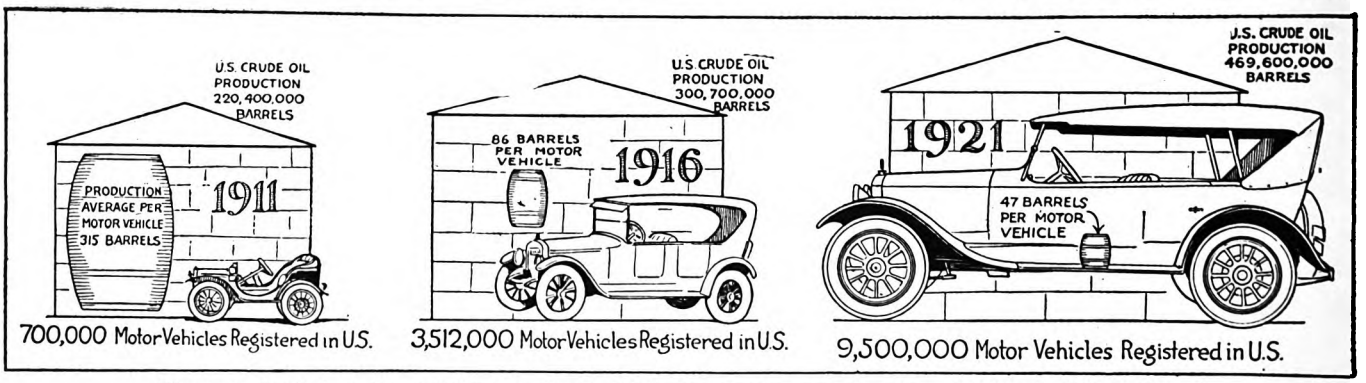
Wood Research Aids Economical Automotive Production. An account of the work which is being, and has been, done, at the Forest Products Laboratory at Madison, Wis., and data on the woods used in automotive construction obtained there. The main woods are maple, elm, birch, hickory, red gum, oak, Southern yellow pine, and data are given on these as well as many other less used woods. *Automotive Industries,* 6-8-22, 2700 w. MAH.

France's export of automobiles in 1921 was 19% greater than in 1920.—*Tractor World.*

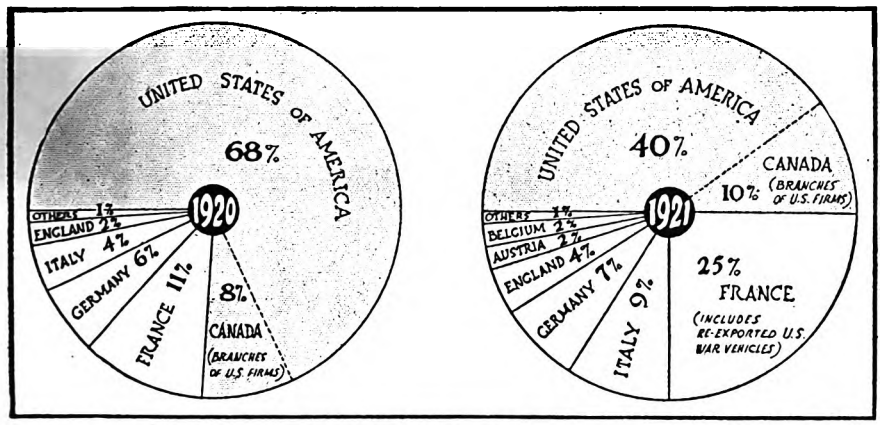
Manufacturing Automobile Body Panels. In this article, the materials used in making body panels are mentioned with the advantages and disadvantages of each. Then the methods of working the more common metals are given, and the tools described, especially the presses. It is now generally admitted that the heavier presses with a wealth of reserve power and strength, produce more uniform results, better and quicker results, and because of the reserve strength are more reliable, making large production more certain to be on time and correct. GEORGE J. MERCER, *Machinery,* 6-22, 2300 w. MAH.

Automotive Engineering Development Rests on Fuel Research. Thoughtful article on the general subject of fuels for internal combustion engines and the possible sources of such fuels, as well as the relation of all these possible new fuels or mixtures of new and old fuels to automotive design of the near future. Alcohol as a sugar by-product is charted from start to finish, tractor performance on alcohol is considered at some length, the chemical and physical properties of alcohol are mentioned, and the experiences of other countries with this fuel cited in detail. HERBERT CHASE, *Automotive Industries,* 6-8-22, 15,800 w. MAH.

Engine Development Aims. Designers and constructors all over the world, and especially in the United States, are seek-



The growth of three large industries in the U. S. during the past decade.—*(Mining & Oil Bulletin.)*



Automotive exports fell off in 1921, but U. S. remains greatest single exporter.— ***(National Automobile Chamber of Commerce.)***

ing admitted lacking qualities of automotive engines. Under average use, lack of fuel economy is one of these. Work being done along the line of a constant compression engine is expected to help this situation, and there is a possibility that supercharging, found so helpful for airplane work, may prove sufficiently beneficial to warrant its everyday adoption; higher compression ratios are being tried, solid fuel injection (along Diesel and modified Diesel lines) may be of some assistance, as may others. Author expects to see a moderate priced car of average characteristics soon doing 40 miles per gal. or better. HERBERT CHASE, *Automotive Industries,* 6-8-22, 4800 w. MAH.

Widespread Research in Air-Cooled Engines. Great interest has been displayed in air-cooled engines, and many manufacturers are known to have new designs about ready for market. Doubtful whether this has been inspired by a desire for lighter weight, for lower economy costs, for simplicity and few parts, or a combination of all three. Author chronicles what work has been, and is being done, on new designs. He takes up piston and cylinder temperatures in air-cooled motors, cylinder and valve design, relative power outputs, testing methods, new cylinder forms, the use of copper for radiating fins, and similar topics. J. EDWARD SCHIPPER, *Automotive Industries,* 6-8-22, 5100 w. MAH.

Non-ferrous Metal Research Will Improve Small Automotive Parts. Not much non-ferrous metal is now used for automotive vehicles because rust-proofing processes have made it possible to use steel, which is cheaper and, in the majority of cases, stronger. However, research now in progress will prove the greater desirability of certain non-ferrous metals for particular uses, and this, in turn, will lead to their wider use. Among the studies now in progress may be mentioned the thermal expansion of commercial nickel, the heat expansion of monel metal, dip brazing with high-melting point brass, and others. *Automotive Industries,* 3700 w. MAH.

Research for Best Alloys for Pistons. An account of the work which has been done in England to determine the most suitable alloys of aluminum for internal combustion engine pistons. It has been found that alloys with a high percentage of zinc were unsuitable because of their rapid falling off in strength at high temperatures. Harder metals were added to offset this, manganese, molybdenum, tungsten, chromium, vanadium and iron being tried. These were really not successful since they made the resulting alloy very brittle and introduced foundry difficulties. It was finally ascertained that nickel and magnesium additions to an aluminum-copper alloy were quite satisfactory. This was known as the Y alloy and in its most suitable form had 4% copper, 2% nickel and 1½% of magnesium. At moderate temperatures it is several times as strong as the ordinary copper binary alloy but at 662° F. the tensile strength of the two are approximately equal. This metal can be rolled and forged quite readily. A peculiarity of it is that it shows an appreciable elongation in casting so that it should be easy to produce very clean, sharp castings. *Automotive Industries,* 6-8-22, 2050 w. MAH.

There are now operating in England a number of motor buses equipped with all club conveniences.—*Tractor World.*

New S.A.E. Standards Report Interests Manufacturers. New Standards have been recommended to the S.A.E. by its various standards committees and subdivisions of these. Some are of considerable interest to manufacturers because their adoption will call for important changes. Among the standards mentioned are: Motor truck front axle spindle ends, and hubs, slight change in distributor and magneto mountings, tractor drawbar adjustment limits, rolling tolerance for concave spring steel, width and thickness tolerance, thickness differences, non-ferrous metal specifications, dimensions for ball studs, serrated fittings, allowances and tolerances on various screws and nuts, etc. *Automotive Industries,* 6-15-22, 13,500 w. MAH.

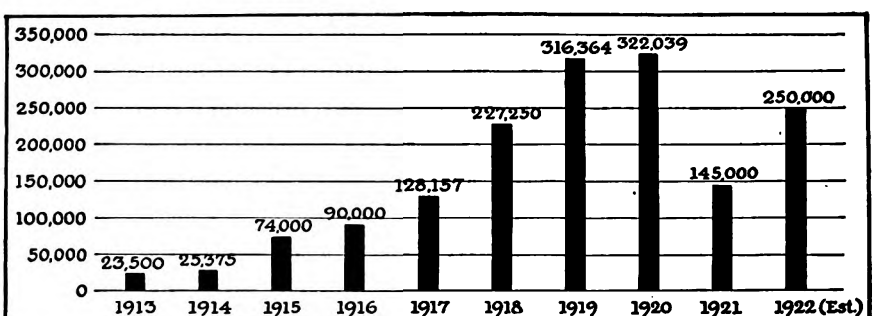
Air Service in Combat, with Other Arms. Digest of speech delivered before an Army association, and consequently the author dwells strongly upon the co-operation of the air service and the Army personnel; also upon the co-ordination of the two. He gives the ideal organization of an air service, defines the duties of each of the various divisions, and takes up in some detail photography, observation duties, captive balloon work, formations, etc. MAJOR H. H. ARNOLD, *Aerial Age Weekly,* 6-12-22, 3950 w. MAH.

Air Traffic. Article treats subject from standpoint of international relations. The general principles on which air traffic must move to circulate in their own and other countries are noted, and such other topics taken up as national legislation, French interior regulations, inspection of aircraft and pilots, statistics, insurance, etc. G. SUDRE, *Aerial Age Weekly,* 6-12-22, 2100 w. MAH.

Flying in the air without an engine is now an established fact, but only for a short time and distance. To encourage developments in this line, a prize of 100,000 marks has been offered in Germany. This motorless airplane contest is to take place between April 1 and October 31. The airplane without a motor is called the sailplane. Under the conditions of the contest, the sailplane must first fly for forty minutes, then against the wind between two marks placed 100 meters apart, and finally continue the flight for at least five kilometers.—*Steam Shovel and Dredge Mag.*

Henry Ford, of "flivver" fame, is perfecting a process of manufacturing near-leather for body tops of his automobiles. —*Steam Shovel & Dredge Mag.*

Either gasoline or acetylene can be used in an English device to prevent motor-truck radiators freezing.—*Steam Shovel & Dredge Mag.*



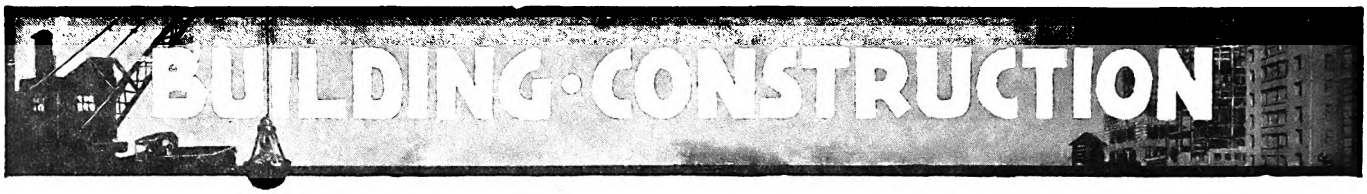
The growth in the output of commercial cars since 1913.— ***(The Chilton Co.)***

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Building Prospects Continue Good

GENERAL satisfaction with building is evident among representative firms in the Eastern construction industry. Replies to questionnaires sent out by the Dow Service Daily Building Reports (says *Architectural Forum*) indicate that the principal retardants to a free construction market are the high cost of labor and materials and the shortage of money for commercial building purposes.

Some of the firms questioned were of the opinion that the only reason production does not exceed demand is because the fuel shortage has prevented full capacity production. Others charge that production is being held back to keep prices high in the face of growing demand. Still others believe that there will be a reaction in demand for new buildings due to the lessening returns from rent.

Contracts that are already let for the remainder of the year are sufficient to prevent a general price slump before the opening of the 1923 season, according to the bulk of replies received. Most of those answering believed that the price peak had been reached, if no further influence was exerted upon it by the coal strike.

Replies to the question as to whether labor is at present freely available or scarce brought replies from 29 that available labor was either inefficient or practically out of the market; 61 reported plenty of labor. The greatest scarcity is apparently among bricklayers, tile layers, plasterers and some metal workers. Opinion was practically unanimous that labor liquidation would not take place before 1923 building season begins.

Art and Organization. Discussion of relations existing and which should exist between architects of buildings and landscape architects. A very good presentation of the reason for existence of the profession of landscape architect, as distinguished from gardener and architect. RICHARD SCHERMERHORN, JR., *Amer. Architect*, 7-5-22, 3000 w. EMcC.

Simplified Designing Methods. Paper on computation of stresses in elastic and semi-rigid structures by using models of paper or of celluloid, applying unit loads and reading the distortion with micrometer microscope. To be complete in two parts. GEORGE ERLE BEGGS, *Amer. Architect*, 7-5-22, 4500 w. EMcC.

Hydraulic Design of Bridge Waterways. Should be based on engineering judgment, not on ancient formulas. Run-off formulas should not be relied upon in bridge proportioning. Covers: run-off, cloudburst floods, cloudburst rainfall, discharge rates from small areas, rates for designing bridge waterways, scour velocities, what determines scour, scour protection, effect of pounding, retarding effect of bridges, end effect, data needed. IVAN E. HOUK, *Eng. News-Record*, 6-29-22, 6000 w. CS.

Costs of Buildings. Eleventh of series of cost data given by architects from several States on various types of buildings. Figures are actual costs and are given on the cubic foot basis, with description of each building sufficient to fix the type of construction and the equipment—six residences, two schools, one factory, one business block, one apartment house, one aged people's home, one public bathhouse. *American Architect*, 7-5-22, 1 p. EMcC.

Specifications for Concrete Work on Buildings. Continuation of article on how to write and enforce specifications for concrete buildings. This article takes up floors, roofs, sidewalks and stairs. *Amer. Architect*, 7-5-22, 3000 w. EMcC.

Architectural Acoustics. Third and concluding installment of article describing studies made for soundproofing of offices of three Federal Reserve Bank buildings. PAUL E. SABINE, *Amer. Architect*, 6-21-22, 2500 w. EMcC.

What It Pays to Know About Heating. Chapter VI. Covers vapor heating, giving radiation chart for determining radiator sizes. M. WILLIAM EHRLICH, *Sanitary & Heating Eng.*, 6-30-22, 1500 w. CS.

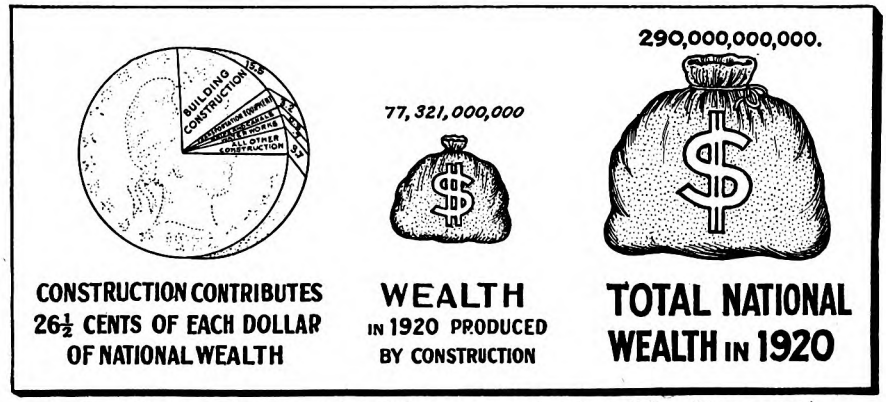
Suggested Code Sections Regulating Uses of Gypsum Plaster Board. Fourth article of series, dealing with definite uses for which plaster board is particularly adapted. VIRGIL G. MARANI, *Permanent Builder*, 6-22, 1000 w. CS.

Frame Houses and Fire Hazard. Statistics presented in interesting style showing small percentage of fires in frame houses. Useless to replace wood where now used with other materials, but attention should rather be given to ways eliminating carelessness of occupants. WILLIAM BAYLESS, *Architect & Engineer*, 5-22, 1200 w. CS.

Fire Resistive Qualities of Frame Buildings Protected by Stucco. Results of tests at Underwriters' Laboratories on metal lath and plaster and stucco. Preliminary report indicates that this finish can be expected to furnish substantial barrier to passage of flame into hollow spaces back of it for about one hour when exposed to fire of severity to which stucco finished buildings are likely to be subjected. WHARTON CLAY, *Eng. World*, 6-22, 3000 w. CS.

The Concrete Pile. Covers development, types and advantages. Advantages of concrete piles over wood piles are: (1) Independence of ground water level. Concrete piles may be cut off at any level, thus effecting great savings in excavation, sheeting, shoring, pumping, etc. (2) Structural integrity of pile is assured, provided proper type of construction employed. (3) Bearing capacity two or three times greater, thus reducing area of footings. Illustrations showing results of tests and various types. GEORGE P. MORRILL, *Concrete*, 6-22, 4000 w. CS.

Hot Water Systems in the Home. Explains various types and describes their proper application. Also how to install storage boilers. RALPH G. HARRIS, *Amer. Builder*, 6-22, 2000 w. CS.



Contribution of construction industry to national wealth.—*(Contractor).*

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And Now—Concrete Lumber

THAT recent predictions in regard to the increased use of concrete as a building material were justified is indicated by the recent invention of what may be termed "concrete lumber." This material, says the *Building Witness,* may be purchased in the same manner as ordinary lumber and erected in similar fashion without the need of elaborate forms or molds. It is said to give a finished result equaling that achieved by the pouring method.

One style of this lumber consists of standard "boards" which are furnished in a variety of sizes. They are made by pouring concrete over special re-enforcement consisting of iron rods and heavy-mesh wire. This is aged a little over a month before being sold so that when the purchaser buys it he can erect his concrete building without any delay.

The other type of concrete lumber has two basic types of construction—one for walls and one for floors. The wall type consists of small concrete boards, at the end of which are grooves, into which key plates, also of concrete, may be fitted. The floor sections consist of square plates, which when placed with their open sides together, form a hollow slab. The adjacent squares are laid two inches apart. A steel rod is then inserted in the opening and the space filled with concrete, thus solidifying the whole floor into one piece and providing the necessary re-enforcement.

Interpreting the Chemical Analysis of Portland Cement. Suggested system for recasting results of chemical analyses has not demonstrated any definite relationship between such results and behavior of cement when subjected to physical tests. Covers various tests of finished cement. J. C. WITT, *Cement & Eng. News,* 6-22, 3000 w. CS.

Electric Cement. Description of French process for making cement in electric furnace, by fusion of raw materials. Raw materials are ferruginous bauxite and limestone. Under certain conditions of calcination and cooling, aluminous cements are quick setting, when cooling very slow, setting generally very quick. Chemical and physical results of tests given. HENRY J. HARMS, JR., *Concrete,* 6-22, 1500 w. CS.

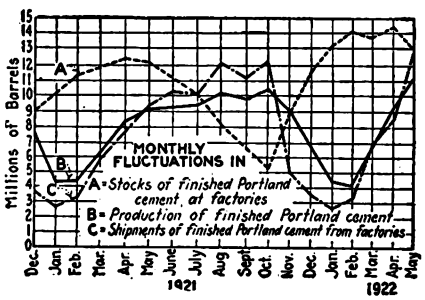
Cement. Covers origin, manufacturing history and costs, and uses as building material. DWIGHT F. JENNINGS, *Building Materials,* 3-22, 2000 w. CS.

Possibilities of Fusion Process for Cement Production. In fusion process the higher the temperature of fluid material the better its working action, and more rapidly will it assimilate material being fed into fusion zone. Difficulties to overcome are: Obtaining sufficiently high temperatures, obtaining refractories, and almost general belief that fusion of clinker deteriorates its quality. Three methods of raising flame temperatures are: Using oxygen enriched air for combustion, regeneration or recuperation of air for combustion, and working flames under super atmospheric pressure. Briefly, fusion process presents difficulties, not insurmountable, and contains possibilities in fuel economy that rotary kiln with sintering methods does not. Several graphic charts. S. L. MEYERS, *Concrete,* 6-22, 2000 w. CS.

Concrete Work Is Economical. Written from local point of view, showing reasons for use of concrete and economy. KENNETH ROTHERMEL, *Concrete Products,* 6-22, 1000 w. CS.

Strength of Concrete. Results of tests show that, for materials tested, strength of concrete is almost independent of strength of coarse aggregate. Tables and charts of results given. F. E. GIESECKE, *Eng. News-Record,* 6-29-22, 1500 w. CS.

Cement or Granolithic Finish on Concrete Floors. Factors involved: importance of wear-resisting qualities, economy of initial installation against permanence, appearance, level cost. Description of various methods and tests given. JOSEPH C. GRADY, *Concrete Products,* 6-22, 2000 w. CS.



May figures for cement production, by Geological Survey, show increase of 1,895,000 bbl. over May, 1921, while shipments were 3,261,000 bbl. heavier. Stocks were 1,643,000 bbl. lower than at end of April, but 447,000 bbl. larger than year ago. April imports were 10,855 bbl., against 1,597 in March; exports amounted to 75,412 bbl., against 103,556 in March.— ***(Engineering News-Record.)***

Grinding and Pulverizing with Air Separation. Description of methods and apparatus for air separation for cement mills. S. B. KANOWITZ, *Concrete,* 6-22 1500 w. CS.

Removal of Clay from Sand and Rock. Part VII. Importance of using proper apparatus in removing forms of clay that are not free. How film clay and tough, compact lumps are removed. EDMUND SHAW, *Rock Products,* 5-6-22, 3500 w. CS.

Talc. Mineral in powdered form is used in paper as filler, in ready roofing as filler, in paints as inert extender, in rubber as dusting agent and filler, in textiles as filler, in soap, in toilet preparations, in wire insulating compounds, as ceramic material and in dressing leather. Also used as chalk, and when baked as gas burner tips and electric insulation. Largest markets in Northeastern States. No system of centralized marketing points exist. Exports negligible. No generally accepted standard specifications and tests now exist. Chemical tests of little value, for value depends upon physical properties, such as color, fine grain size, "slip" and "retention." Specific gravity of ground talc may be of importance in some industries. Various types named for district from which they come. No system of premiums or penalties prevails. Trade customs as to shipment and settlement. Price varies greatly, but fluctuations are small and changes are slow. Imports are important factor in recent years due to high-grade Italian and French talc. R. B. LADOO. *Eng. Min. J-Press,* 6-3-22, 2000 w. CJW.

Mica Occurs in Various Forms, Colors and Sizes. About 4% all igneous rocks are mica. Covers: Composition and physical properties, occurrences and origin. OLIVER BOWLES, *Cement, Mill & Quarry,* 6-20-22, 2000 w. CS.

To Produce Magnesium Carbonate and Potash Alum. Description of deposits and proposed method producing magnesium carbonate and potash alum on commercial scale. *Cement, Mill & Quarry,* 6-20-22. 500 w. CS.

"Armored" aluminum, used in the manner of reinforced concrete, is now obtained by embedding in the aluminum mass thin steel portions which transmit tensile stresses, the surrounding aluminum being relied upon to take care of compressive stresses.—*Steam Shovel and Dredge Mag.*

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Protection Needed for Potash Industry

THE American potash industry, through appeals from the American Fertilizer Manufacturers and Potash Producers Association, has urged Congress from the beginning of the present tariff agitation to place a graded duty on imported potash over a period of five years to the end that the American potash industry might be protected. As a result of the recent action of Congress in killing the so-called dye embargo plan it is not believed that the graded duty plan has much chance of success

That the American potash producers' plea is borne out by the facts as collated by the Government and by the U. S. Geological Survey is suggested by the *Chemical, Color and Oil Record.* According to this survey, the general business depreciation, the peculiarly disorganized condition of the fertilizer business, the high freight rates and the low price of foreign potash are given by former producers of domestic potash as the reason for the small production in 1921. At the end of 1920 many domestic producers had closed their plants. In 1921 only 25,485 short tons of potash materials, containing an average of 39.9% K20, were produced in the United States by 18 companies operating 20 plants.

The difference in output and sale between 1920 and 1921 is shown herewith from the official figures: 1920—139,963 short tons of potash (crude, chloride, sulfate, cement dust, first sorts and caustic) containing 41,444 short tons of available K20. 1921—10,337 short tons of crude potash (mixed salts, chloride, cement dust, sulfate, low-grade chloride and crude caustic), containing, 4,480 short tons of available K20.

Tar and Its Simple Crude Derivatives. Discussion of uses to which some of various tars are put and usual methods of working up tar into some of its simple or easily prepared derivatives, for which market can generally be found. Although coal tars are given chief consideration, properties and characteristics of water-gas tars are mentioned, for reason that this tar is often produced in plants where coal tar is made, mixed tar being collected and marketed, and also because presence of water-gas tar in some coal-tar products is specifically interdicted by commercial specifications. Not a handbook on tar distillation but general treatise on utilization of tar. Uses include timber preserving, fuel, tarred felt, paint for stonework, brickwork and iron, road construction material, waterproofing and roof paint, germicide, etc. Commercial products prepared from crude distillation products include paints (metal, roof, pole and post), shingle stain, roof and flume cement, disinfectants and insecticides and wood preserving oils. W. W. ODELL, Technical Paper No. 268, Bureau of Mines, 84 pp., 1922. CJW.

Nitrate. Ford's offer has called attention to vital importance of adequate supply of nitrate in peace as well as in war. His proposals are economically sound. Supply of Chile nitre far from exhausted. Vast amounts of semi-treated material available when average grade of total reserves is such that large-scale operations are imperative. Recognition of true status of affairs will act as stimulus to economical production in nitrate industry in both U. S. and Chile and must inevitably lead to lowering in price of fertilizers to ultimate consumer. A. W. ALLEN, *Eng. Min. J.-Press,* 7-1-22, 1000 w. CJW.

Sulphur. Practically all of sulphur in U. S. comes from three mines on Gulf coast. Uses many. About 75% burned to sulphur dioxide and used as such. Industries that purchase raw sulphur, in order of importance, are: Acid phosphate, paper, chemicals, sulphuric acid, agriculture, rubber, galvanizing, explosives. Probable world consumption 1,000,000 tons per year. Product may be guaranteed 99.7% pure on moisture free basis. Color not reliable guide as to purity. Description of flour sulphur, flowers of sulphur, and roll sulphur. Problem is to enlarge market. One great influence on price is price of pyrites. Present price from $14 to $16 f.o.b. mines per ton of 2,240 lbs. ALBERT G. WOLF, *Eng. Min. J.-Press,* 7-1-22, 2500 w. CJW.

Cyanogen Compounds. Description of development of process in Canada. Present practice consists in mixing raw lime, nitrogen, rock salt and calcium carbide. Mixture fed into large crucible shaped electric furnaces, lined with carbon blocks. Very high current density employed so that heating of mixture between end of electrode and bottom of furnace is extremely rapid. When current reaches certain fixed upper limit, corresponding to known temperature of fused cyanide inside furnace, tap hole is opened from which it flows to sump, where it is rapidly cooled by means of rotating steel wheel having continuous water circulation through hollow shaft and rim. Process continuous. HORACE FREEMAN, *Can. Chem. Met.,* 6-22, 2000 w. CJW.

Sulphuric Acid Concentration. Study of physical properties of sulphuric acid solutions with curves for determining heat required for concentration and thermal efficiency of operation. Original must be consulted for detail shown best by means of curves. F. C. ZEISBERG, *Chem. Met. Eng.* 7-5-22, 1500 w. CJW.

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Chromates of Lead. Lead chromates have completely superseded use of vegetable dyestuffs for dyeing of yellows, oranges and most kinds of greens upon cotton. Cost of production is low, impart to cotton extra weight which cannot be obtained with aniline dyes, and are extremely fast. Discussion of various salts of lead and chromium, chrome yellow, chrome orange, etc., with suggestions as to their use in dyeing. Modifications of shade by other reagents. WM. B. NANSON, *Textile American,* 6-22, 7-22, 4500 w. CJW.

Naval Stores. Popular and well-illustrated article on manufacture of rosin, turpentine and pine oil from waste stumps and wood of South. Compressed air used for pumping water, each well being equipped with Ingersoll-Rand foot piece and deflector tank. Also used in machine shop and shredder house for cleaning machinery. N. S. GREENSFELDER, *Compressed Air Mag.,* 7-22, 1500 w. CJW.

Natural Dyestuffs. Dyes may be obtained from the pokeweed berries which have been used for imparting deeper red color to wine and for inks. A yellow dye is obtained from vijao, which is same as that from ginger. Pomengrate yields red and yellow dyes, which are said to possess good fastness. Bhel tree yields a yellow dye, which, however has been supplanted by artificial dyestuffs. Dye from pipal tree gives good pink color to cotton mordanted with alum, which is said to be fairly fast. C. D. MELL, *Textile Colorist,* 7-22, 1200 w. CJW.

Water Purification. Brief review of methods used. Efficiency of any water treatment is measured by effect on death rate. While common method of measuring efficiency of any filter is to measure bacteria removed, after all death rate or case rate of water-born disease is crucial test. J. B. MARCELLUS, *Intern. Steam Engineer,* 6-22, 1200 w. CJW.

Black Pigments. General discussion of manufacture of black pigments. First instalment discusses manufacture of carbon black. H. L. BLACKFORD, *Canadian Chem. and Met.* 7-22, 2000 w. CJW.

CLOTHING·GARMENTS

The More Tires the Less Attire

THAT the popularity of automobiling constitutes a menace to the clothing industry has received little consideration. But *Manufacturing Clothier* points out that the tendency toward the lowering of the dress standard is due in a large measure to the use of the automobile. It has been estimated that three suits of clothes are being purchased now where before five were bought by owners of cars.

It is believed that education along the line of proper dress for automobiling is necessary. If through the use of the auto the clothing business is losing out, styles must be created in the line of proper and useful dress for motoring. What is needed is more classes of clothing to be used rather than more uses for those that are now sold. This must be met by advertising and selling policies.

"If the retailer cannot convince the customer that he should spend $35 to $40 for a new suit in order to be well dressed, the radio dealer or the motor car man or some one else is going to get that $35 or $40," says *Manufacturing Clotheir*. The more general use of summer clothing is going to call for the best efforts of the designer to produce it in a manner that will please the average customer. This is especially true in the case of the man who buys summer clothing for the first time and expects it to fit just as well as a suit of heavier material such as he is accustomed to wearing.

Knit Goods. Regular monthly contribution describing new productions in knit goods industry. Described drop stitch mercerized stocking for ladies, in which drop stitch is carried to toe reinforcement. Another new stocking is made of artificial silk plated on mercerized yarn. Never been applied to hosiery for women in such perfected state. Chief interest in matter of fabrics, as well as shade, centers in silk and wool hosiery for fall. CARSON KING, *Textiles, 7-22,* 1000 w. CJW.

Flaxen Fabrics. Popular article, discussing history of flax and its manufacture, present methods of manufacture and uses. Fabrics very numerous and differ widely in appearance and application. Moisture evaporates from it quickly, so it is valuable where cleanliness is essential. MRS. CHETWOOD SMITH, *Fibre and Fabric, 7-4-22,* 1000 w. CJW.

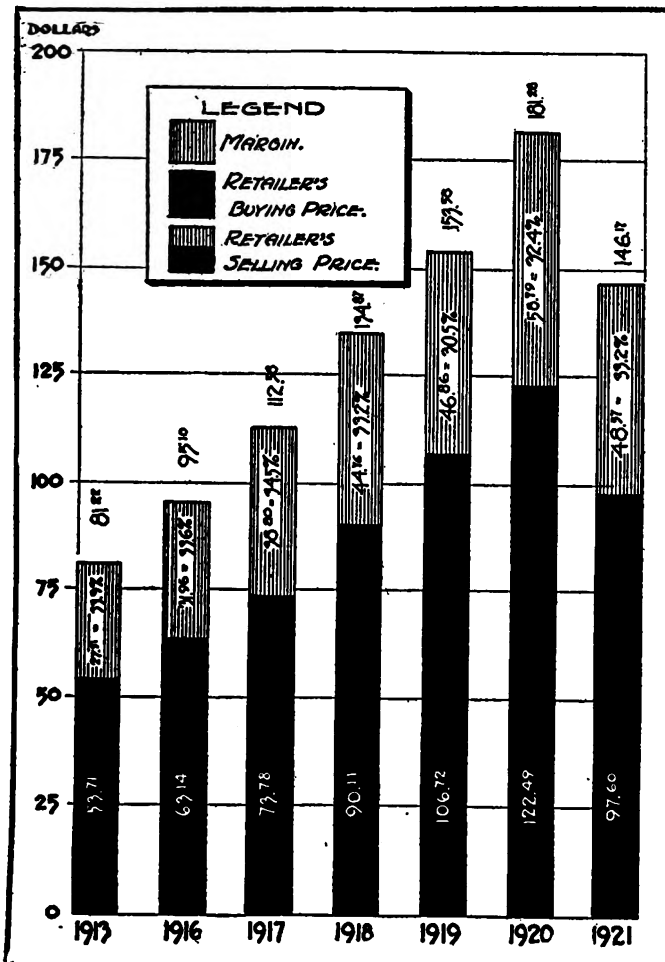
Pongee Silk Troubles. Dry cleaning process not very satisfactory. Best thing is to run it through washer with good benzine soap and after rinsing and drying to wash goods with soap bark or tetropole solution and finally wash with acetic acid. Stains should be studied and various medium applied to different classes of stains. Best results obtained with hydrogen peroxide bleach. May have to use blue dyestuff. Should use two baths in dyeing. That is, bottom with direct colors and top with acid colors with addition of formic acid. If finishing is done damp, pongee should not be sized. JOSEPH LOEBL, *Am. Dye-Stuff Reporter,* 6-19-22, 1000 w. CJW.

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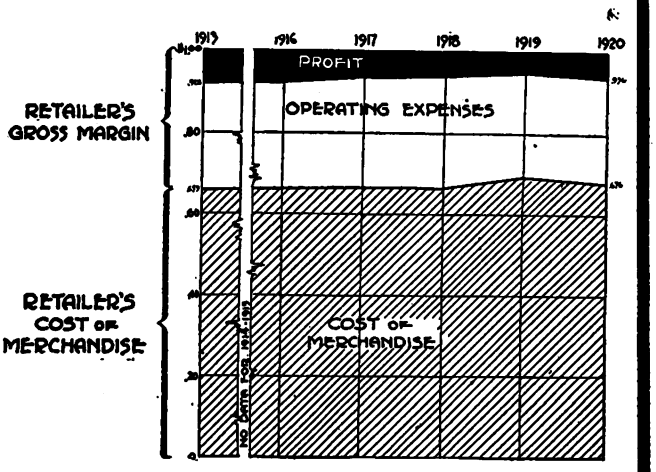
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How the dollar for drygoods merchandise is divided: (left) retail total of average of 37 commodities, 1913-1921; (below) retailer's distribution of the consumer's dollar, 1913-1920. The profit on retail dry goods averaged 5.4 cents per dollar of sales over the whole period. Figures are available for only six years. The largest profit was obtained in 1916, when the average was 7.3 cents for each dollar of sales.—*(Joint Commission of Agricultural Inquiry.)*



ELECTRICITY

Railroading Theories Upset by Electrification

IN the opinion of a writer in the *Journal of the American Institute of Electrical Engineers* the electrification of steam railroads may be more easily accomplished if the advocates of such electrification take into consideration the difficulties surrounding its adoption. In the first place it is pointed out that electrification requires a tremendous addition to the investment per mile, with the consequent difficulties not only of earning the additional interest charges involved, but also of financing. Moreover, electrification upsets some of the fundamentals around which steam railroad practice has been built up inasmuch as it practically substitutes an unlimited for a limited motive power.

But when the advantages resulting from the electrical operation of trains are considered, it would appear that it must be only a question of time until the system becomes general. For example, the long accepted practice of calling 2% the maximum grade over which a desired schedule may be made goes into the discard and much steeper grades become entirely practicable. Likewise, the tonnage and speed of freight trains, previously restricted by the power of a steam locomotive, is no longer so limited. Freight trains may be as long as the structural strength of the freight cars will permit, or as may be handled in the yards and on the sidings. Schedule speeds may be increased to any point considered safe for the track and equipment and are no longer limited by the steam power of the locomotive. Instead of accelerating from a standstill at the rate of one-quarter of a mile per hour per second, as is now common steam locomotive practice, passenger trains may be accelerated at the rate of from one and one-half miles per hour per second.

It is now very generally admitted that all electrifications heretofore have been successful and that no electrified road would return to previous practices. The question now asked by railroad men is not, "Can it be done?"—but "Will it pay?"

Queenstown-Chippewa Development of Hydro-Electric Power Commission of Ontario. General description of entire development which will ultimately have capacity of approximately 650,000 hp. is given in this article. F. A. GABY, *Jour. Am. Inst. Elect. Engrs.*, 7-22, 8,000 w. IG.

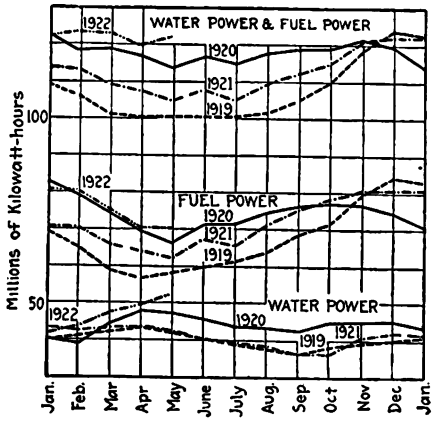
220-KW. Transmission. Description of Southern California Edison Company system. Various researches were made with this system. It is concluded that there are no apparent obstacles in the way of 220 kw. transmission, the only requirement being that the amount of power transmitted shall be sufficiently large and distance great enough to warrant cost of 220 kw. equipment. Increased carrying capacity of transmission lines then more than offsets equipment cost and 220 kw. transmission becomes more economical than at any lower voltage. R. J. C. WOOD, *J. Am. Soc. Elect. Engrs.*, 7-22. 12,000 w. IG.

Management of Direct-current Machinery. A section of a continued article on this general subject, this one takes up commutator, causes of sparking, the proper position of the brushes, method of placing these to insure exact spacing, and other similar items. M. BARRY WATSON, *Power House*, 7-5-22, 3300 w. MAH.

Tests on General Electric Oil Circuit Breakers at Baltimore. Detailed report of these tests is given. Proved that FH type of breakers could be constructed to interrupt heaviest short circuit on large power system within its voltage rating and without oil throw. J. D. HILLIARD, *J. Am. Ins. Elec. Engrs.*, 7-22, 5,600 w. IG.

Development of Electron Tube Amplifier. This tube uses 60 cycle alternating current to supply power for the filaments and plates. Description of five-stage amplifier in radio work forms main part of article. Diagrams of connections are given. P. D. LOWELL, *Jour. Am. Inst. Elec. Engrs.*, 7-22. 2,500 w. IG.

Control of Substations. Electrically operated switches and protective devices for automatic control of mine substations have made possible in some cases in anthracite and bituminous fields 10% production increase and considerable saving in operating expense. By locating substation in old room near load center of gathering locomotives, cutting machines, pumps, etc., distribution losses are kept down. Make possible saving of feed copper and good voltage regulation at points where it is needed. Scheme of operation discussed in detail. M. E. REAGAN, *Coal Industry*, 6-22, 2500 w. CJW.



Electrical load is increasing. These curves show the average daily production of electricity by water power, fuel power, and both together, in central stations of the United States, from the beginning of 1919 to the end of May, 1922.—*(Power.)*

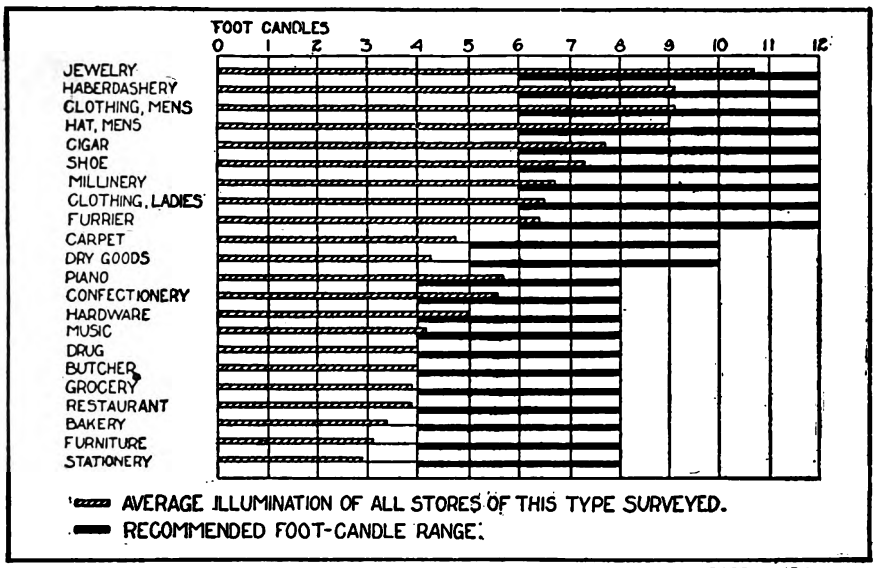
Factors in Commercial Management. How operation of plant for profit can be accomplished in harmony with giving of best service. With right kind of service and market, the rest is easy. S. H. SHUTT, *Telephony*, 7-15-22. 4,500 w. IG.

Standards of Rating with Particular Reference to Large Machines Using Class B Insulation. Basic principle of testing is so-called hottest spot principle in determination of limiting temperature. Two factors must be determined, limiting safe temperature of insulation employed and difference between hottest spot temperature and highest temperature it is possible to measure by designated commercial method. Various methods of obtaining these factors are discussed. F. D. NEWBURY, *J. Am. Inst. Elect. Engrs.*, 7-22, 4,500 w. IG.

Foreign Wire Relations' Problems. The great necessity for cordial and close relationship between telephone and power companies is pointed out. Various features in proper construction of jointly occupied pole lines are described. Substantial poles must be properly located and set; corners must be strong; proper guying, and particularly placing of strain insulators, essential; should be clearances between different classes of circuits both horizontally and vertically; climbing spaces must be provided. W. H. CURRAN, *Telephony*, 7-15-22. 4,000 w. IG.

Overpotential Test for Insulators. Some factors met with in design of insulators and characteristics of routine electrical tests are discussed. New overpotential test is described with its application and effects. Results of this test make possible higher standard of practice in manufacture and use of transmission line insulators. Test has been devised for purpose of meeting increasing demands for reliability in transmission of power. In test a definite chosen potential in excess of its highest normal flash-over voltage is applied to an insulator. By elimination of doubtful material minimum factor of safety of insulators can be raised to point where sound dielectrics are assured. G. W. LAPP, *J. Am. Inst. Elec. Engrs.*, 7-22. 4,000 w. IG.

Electrical Engineering Features of Precipitation Process. No general conclusion can be drawn from data here pre-



The average illumination found in metropolitan retail stores in 1921.—*(Lighting Fixtures & Lighting.)*

sented, except that it appears that power consumption does follow quadratic law given by Peck, and that this law is applicable to electrical precipitation. However, it should be said that certain experimental data indicate that fume or dust carried in suspension in gases may effect electric discharge and may decrease power consumption. It may also be concluded that fume may also cause considerable increase in corona starting voltage. Also shown that Peck's expression for corona loss may be used as means of interpreting electrical precipitation power data. G. H. HORNE, *J. Am. Inst. Elec. Engrs.*, 7-22, 4,500 w.

Conclusions Pertaining to Electrical Precipitation. Review of results that have been obtained in past few years with use of electricity to precipitate fumes. W. A. SCHMIDT, *J. Am. Inst. Elect. Engrs.*, 7-22, 5,500 w. IG.

Electrical Hazards. Difficult to teach fear of electricity. Therefore necessary to use great precautions in proper installation. Greatest hazard in factory from low-tension distribution. One-half ampere through body is sufficient to prove fatal. Suggestions are given as to proper installation of switchboards, wiring distribution, switches, fuse protection, extension and drop cords, protection of motor connections and elimination of grounded conditions. "By making safety alteration today you may save a life tomorrow." W. J. PEFFERLY, *Eng. World*, 7-22, 1600 w. CJW.

Making Radio Parts. A description of some of the more important radio apparatus parts, and the methods of making these in the larger shops where quantity production prevails. Much of this is screw machine work, and consequently there is little novelty in its manufacture. A considerable additional part is power press work, this too being quite ordinary. FRED R. DANIELS, *Machinery*, 6-22, 2600 w. MAH.

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Locating Faults in Direct Current Armatures. Effects of short circuit in group of coils in armature windings are discussed and method of locating faults is described. B. BRIGGS, *Power*, 7-11-22. 4,500 w. IG.

Shellac Substitutes. Shellac solutions, because of ease of application and reliability, are used almost exclusively for joint sealing compound in meter repairing. Too costly. Various mixtures of rosin and shellac may be used as substitute for pure shellac. Two components dissolved separately in methyl (wood) alcohol and mixed in proper proportions. Because of short-fiber property of rosin, mixture will allow diaphragms to be easily stripped from meter flanges without tearing them. Saving ranges from 19% to 76%. J. H. SCHALEK, *Gas Age-Record*, 7-15-22, 1000 w. CJW.

An electric barrage which charges certain areas of water with electrodes has been devised to prevent fish from entering irrigation canals and ditches and later perishing by thousands in the fields. —*Steam Shovel & Dredge Mag.*

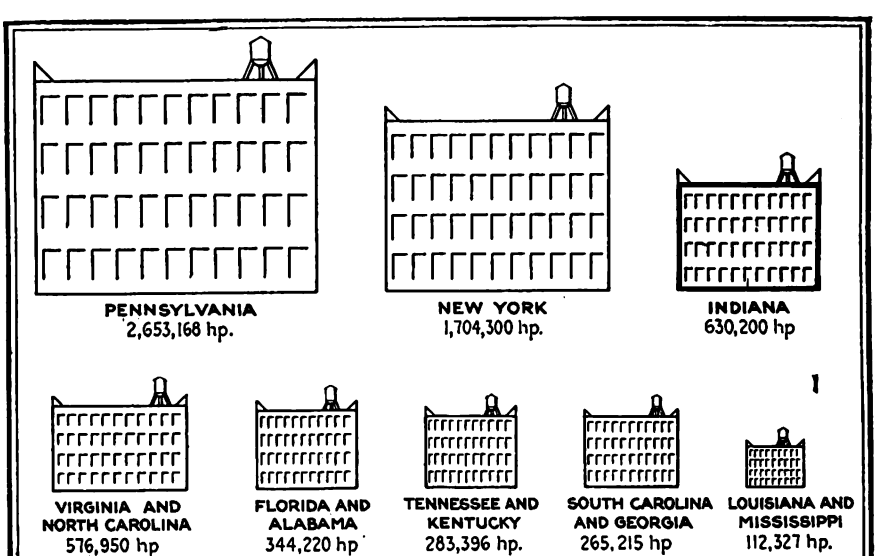
Fiat Electric Steel Furnace. Fiat a "fast" furnace, of large output and is characterized by perfectly tight roof maintained by means of special economizer. Furnace consists of cylindrical steel plate shell, properly reinforced, having hemispherical bottom to which are attached circular shoes of cast iron which permit whole to be rotated in either direction. Only two openings, one serving for charging and other for pouring. Economizer consists of cylindrical water pocket through which electrode passes. Series of insulating rings are provided inside cylinder, keeping electrode from contact with metallic wall. Hermetic seal about electrodes prevents oxidation and reduces electrode consumption. Illustrated. A. STROMBOLI, *Chem. Met. Eng.* 7-5-22, 1000 w. CJW.

Electric Arc Welding in Coal Mining. Three prime requisites for successful arc welding are proper equipment, and materials and requisite skill. Kind of equipment must give heat application and heat control necessary and must be easily handled. Volt-ampere characteristic for arc welding circuits must facilitate rapid variation of current and voltage in response to variation of arc resistance. Skill must be divided into engineering, supervisory and operating. Organization of Rock Island railroad discussed. (To be continued.) E. WANAMAKER, *Coal Industry*, 6-22, 2500 w. CJW.

Electric Railway Lubrication. Discussion of methods of lubricating various parts of driving mechanism and gear on electric railway trains. Gear and bearing lubricants are included in discussion. Seven general methods of lubricating motor bearings are known, viz., grease, grease and oil, oils and rings, oil and waste, vaseline packed, circulating oil, special adaptations and joggle type. D. TREAT, *International Steam Engineer*, 7-22. 3,000 w. IG.

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Electrified power of eight States, with emphasis on Indiana with its industries 60% electrified.—*(Electrical World.)*

IRON·STEEL

Steel Consolidations Still Pending

THE drift toward consolidation is probably the most obvious fact in the steel industry today. While some companies that have been included in recent merger projects have not decided to go ahead with those particular plans, *Iron Age* believes that movements toward large capital aggregates is likely to go farther.

In view of the happenings of the last year, and of what is ahead when the real test comes after the coal strike, the independent producers say that the new consolidation movement represents an effort to give the Steel Corporation real competition. Steel company bond issues of the past few years are an index of the unending call for capital to provide new capacity and to make old equipment more efficient. That more than $100,000,000 has been appropriated by the Steel Corporation for the Gary plants alone suggests the expenditures that will be necessary for other steel makers if they are to maintain their position. One modern blast furnace with an accessory ore yard and auxiliary equipment represents approximately $2,000,000, or four times the outlay of 25 years ago. Rolling mills for the production of finished steel can be built cheaply in comparison with the cost of the blast furnaces and steel works requisite to feed them. Thus the idleness of a rolling mill is much less serious from the investment standpoint than that of blast furnaces and steel plants.

Iron and Steel Industry of Australia. Describes the iron deposits which are moderately large and distributed, though many are not situated well for economic exploitation. Description of the various plants and subsidiary industries. DAVID BAKER, *Iron Age*, 6-29-22, 3000 w. APS.

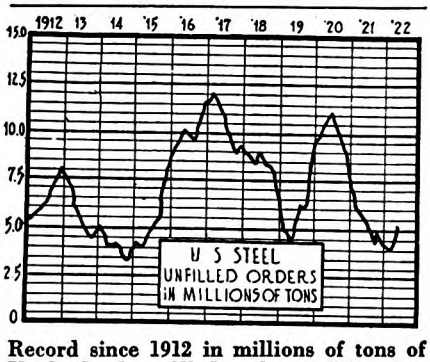
Lower Silicon Irons for Foundries. Lower silicon irons can be used successfully, thus relieving blast furnace-man. The demand for high phosphorus iron is also being overdone. Y. A. DYER, *Iron Age*, 6-22-29, 1800 w. APS.

Silicon in Blast Furnace. Proper control of silicon is one of most important factors in management of quality of cast iron during process of manufacture. In commercial cast iron silicon has at least two effects, first concerning the electrical properties, and second, as a precipitant for carbon. Also has extremely high heat of oxidation and acts as scavenger to remove oxygen. Second effect most important. For irons as used in ordinary gray iron or in malleable foundry work, more important effect of silicon is its influence on condition of carbon. Effect varies with temperature and amount of silicon present, tending to force carbon into form of graphite, this tendency being stronger when the temperature is higher. Not known that it has any particular effect to control shape of graphite, it merely tends to change carbon from form of compound Fe_3C to form of graphite. Gray iron is formed when tendency is just strong enough to cause graphite to form while iron is in plastic but not fluid condition. If graphite is formed after iron has completely solidified it must come out in forms that are characteristic of malleable castings. Effect of sulphur, manganese and silicon upon this process discussed. S. L. GOODALE, *Blast Furnace and Steel Plant*, 7-22, 3000 w. CJW.

Effect of Low-Pressure Oxidizing Gases on Heated Iron. Copper was heated in an iron tube and the gases evolved had an effect on both the copper and iron. Tests made on various types of iron in evacuated silica tube with and without presence of copper at about 1000°C. show that the gases present in the copper are driven off and heat-etch the iron surface producing facets of iron oxide. H. C. H. CARPENTER and C. F. ELAM, *Blast Furnace & Steel Plants*, 6-22, 7 figures, 2000 w. APS.

Electrodeposition of Iron. Continuation. Describes general researches. Very thorough work on the history of electrodeposition of iron, giving operating details, composition of solutions, thickness and appearance of deposited metal, physical and chemical properties of deposit and efficiency of deposition. Critical evaluation of the data of all investigations. A very valuable article to refer to for those interested in electrodeposition of iron. W. E. HUGHES, *Brass World*, 6-22, 7500 w. APS.

Calite. This is an alloy of aluminum, nickel and iron which can be cast but not machined after casting; all finishing must be done by grinding. It resists oxidation up to 1300°C (2372°F). Practically non-corrosive. Melts 2777° after softening at 2500°. Specific gravity 7.03, weighs 0.25 lb. per cu. in., has thermal conductivity 20% that of iron and a tensile strength of 36,800 lbs. per sq. in. It is rapidly dissolved by 25% sulfuric acid, slowly by hydrochloric acid and hardly at all by nitric acid. Fluxes attack calite rapidly. G. R. BROPHY, *Canadian Machinery*, 6-8-22, 1000 w. CJW.



Record since 1912 in millions of tons of U. S. Steel unfilled orders.—*(Magazine of Wall Street.)*

Hot-Galvanizing Process. Discussion of thermal features of process, and attempt to see how, if based on important factor of heat transmission, rate of motion of sheets through bath should vary with sheet thickness. Speeds corresponding to various gages and thickness as calculated are:

Gage.	Thickness, inches.	Greatest permissible speed of travel, feet per minute.	Time for surface to reach galvanizing temperature, seconds.
24.....	0.025	35.0	6.9
22.....	0.0312	15.6	16.
20.....	0.0375	10.0	24.
18.....	0.050	5.9	41.
16.....	0.0625	4.1	60.

For sheets thinner than 0.02 in., the velocity would be limited by other than thermal considerations. J. D. KELLER, *Blast Furance and Steel Plant*, 7-22, 1600 w. CJW.

Boiler Plate. In all grades of plates, increase in temperature above ordinary atmospheric range is accomplished by distinct changes in strength and ductility. Tensile strength decreases few thousand pounds per sq. in. at 95°C. which is followed by a maximum at 290°C., or at 250°C. in plates of lowest tensile strength. With further increase in temperature the strength decreases and again approximates ordinary atmospheric temperature values in range 370-400°C. Limit of proportionality increases to maximum in neighborhood of 150°C. Only slight decrease in elongation is observed until temperature of about 95°C. is reached, above which rate of decrease is much higher and minimum is reached at about 245°C. Reduction of area closely follows inflections registered in curves for elongation but reaches maximum at slightly higher temperatures. Maximum tensile strength does not coincide with minimum reduction of area or maximum proportional limit, but inflection in curves for reduction of area are in general more nearly coincident with reverse inflection in curves for tensile strength and elongation and proportional limit may be similarly paired. H. J. FRENCH, *Chem. Met. Eng.*, 6-28-22, 2000 w. CJW.

Leaves from Steel Melter's Notebook. Part V. Author called to foreign country to investigate and increase output of open-heath steel plant which was unsatisfactory. Heats of steel taking too long and had to be cast too cold leaving

much pit scrap and ladle skulls. Found flames too short and temperatures too low due to poor gas from the producers. Producer practice improved to give better gas. Silicon was high, due to lack of scrap, but was helped by a change in blast furnace practice. Skin holes in ingots were prevented by aluminum. HENRY D. HIBBARD, *Iron Age*, 6-22-22, 6000 w. APS.

Sulphur in Rivet Steel. Organized research on this problem is reported by joint committee on an investigation of phosphorus and sulphur in steel. To be published as technological paper of Bureau of Standards. Abstract now published. Thousands of tests on treated and untreated material. Numerous figures and tables. Conclusion from data to be published later. *Iron Age*, 6-22-29, 3000 w. APS.

Effect of Heat on Certain Special Steels. Study of resultant mechanical properties of carbon-molybdenum and a chromium-molybdenum steel. Effect of different temperatures in normalizing,

Heat Treatment of Large Forgings with Oil, Gas and Electricity. Many large forgings require merely an anneal to pass specifications and for them the heating medium is determined by local fuel conditions. But for large hollow forgings requiring extensive heat treatment other considerations prevail. The electric furnace is considered more economical and better adapted for this difficult class of work. W. E. MCGAHEY, *Amer. Soc. for Steel Treating*, 6-22, 1500 w. APS.

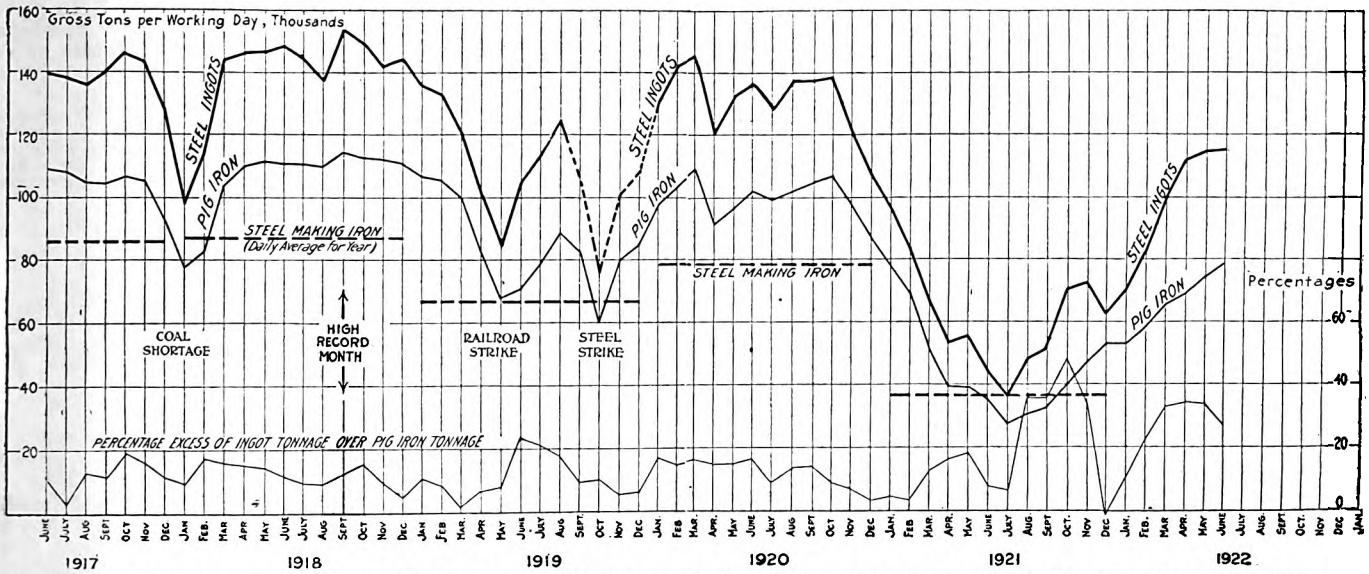
Failures in Case-Hardening Steel. In many cases where the hardening has been deemed at fault the true cause is non-metallic impurities, chiefly dissolved oxides. A small chromium content helps to overcome these difficulties. Abstract of long paper by E. W. Ehn before Iron and Steel Institute of London. *Iron Age*, 6-22-29, 3000 w. APS.

Efficacy of Annealing Overstrained Steel. Anchor chains, hooks, hoisting tackle, etc., are periodically annealed by careful engineers to remove strains. To

size and type. R. R. MOORE, *Iron Age*, 6-29-22, 2000 w. APS.

R. B. Ladoo, mineral technologist of the U. S. Bureau of Mines, recently spent a month in the southern Illinois and western Kentucky fluorspar field in order to complete the investigation of the fluorspar industry. The outstanding feature of the fluorspar situation is that our known reserves are very low, and, unless new deposits are found, fluorspar will be very scarce and expensive within a few years. The development of possible substitutes is being considered. The object of the fluorspar investigation is the eventual preparation of a bulletin on all phases of the fluorspar situation.—*U. S. Bureau of Mines.*

Effect of Electrification on Operation of Steel Mills. General discussion of relation of costs and efficiencies of steam and internal combustion engines and the conversion to electrical energy. The great economy in use of electricity is that if a mill does not require power



Production of steel ingots in the United States, month by month, for the five years during which data have been collected. Figures covering the period of the steel strike have been estimated; all are expressed in gross tons per working day. The pig iron curve is shown, for comparison. The bottom curve shows the percentage by which ingot tonnage, each month, exceeds pig iron tonnage.—*(Iron Age.)*

and the effect of different quenching temperatures with subsequent quenching and tempering at a fixed temperature, etc. The variations in heat treatment studied are very numerous and form a complete study of the steels considered. Numerous tables, graphs, and structural photomicrographs. Study from the Bureau of Standards. H. J. FRENCH, *Amer. Soc. for Steel Treating*, 6-22, 12,500 w. APS.

Arc Deposited Steel. Properties of arc deposited metal, cast and hammer forged under static and dynamic stress, as produced by direct current and steel electrodes. O. H. ESCHHOLZ, *Iron Age*, 6-29-22, 2000 w. APS.

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the question whether annealing is efficacious in such cases the author replies by a series of expeniments which proces that proper annealing suffices to completely restore the normal properties of low carbon steel even after the severest overstrain. IRVING H. COWDREY, *Amer. Soc. for Steel Treating*, 6-22, 350 w. APS.

Fatigue of Metals under Repeated Stress. Discussion of Prof. H. F. Moore's paper of the above name. Endurance limit and ultimate stress are not clearly related. Brinell number and endurance limit are also not related. J. M. LESSELLS, *Amer. Soc. for Steel Treating*, 6-22, 3000 w. APS.

Elastic Properties of Small Wire Cable. Variation in different types such as 19-wire, 7x7 wire, 7-19 wire cable is greater than total values given in handbooks. The modulus of elasticity of small size wire aircraft cable varies from 15,000,000 to 28,000,000 depending on

it does not consume any. The inherent necessity of electricity for auxiliary purposes make use of electricity for main drives very desirable. Figures are given for various types of mills under varying conditions and problems such as operating, labor, maintenance and repairs are considered. Types of equipment are considered 2200 or 6000 volt, 25 or 60 cycles, method of distribution, substation equipment, etc. WILFRED SYKES, *Blast Furnace & Steel Plant*, 6-22, 8500 w. APS.

Chromel Castings, Bars, Wire and Ribbons. Reduction of wire by diamond dies. Testing and inspection. Low and high limits within which chromel wire must test for electrical resistance and similarly for ribbons. E. F. LAKE, *Brass World*, 6-22, 1500 w. APS.

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Danger of Runaway Lumber Market

AT present the greatest danger to the lumber industry lies in the probability of a coal shortage in the fall, says *American Lumberman*. A car shortage at this season of the year is particularly serious because it will mean a curtailment of shipments at a time when demand is heaviest. At present, orders are said to exceed current production and buyers are being urged to place new orders as rapidly as possible, to avoid delayed delivery, abnormally enhanced values and the demoralization that inevitably attends auction buying and a runaway market.

It is pointed out that the surplus of freight cars has already been greatly reduced and when the physical condition of the rolling stock is taken into consideration, this surplus is insignificant as a means of meeting any great increase over the present transportation needs. Car loadings of all commodities have been steadily increasing for some weeks; the only exception being coal, which on account of the strike is moving in relatively small volume. A heavy grain crop will be marketed next month from regions where harvesting is started early in the summer, and when the coal strike is settled the demand for coal will have to be supplied by increased movement of cars from the mines to consuming markets.

The lumber industry has had one disastrous experience with a runaway market—from which it has not yet entirely recovered. And unless every possible precaution is taken, it is feared that this experience may be repeated.

Wood as Chemical Engineering Material. Less expensive in first cost than when made of metal. In case of water and some other liquids, life very long. Does not require frequent painting to prevent corrosion, and usually repairs are easily made. Poor conductor of heat. Not suitable for handling strong oxidizing agents, is readily attacked by strongly alkaline reagents, mechanically weaker than metals, and swells when brought into contact with liquids and shrinks if allowed to dry out. Results of action of solutions on woods and discussion of use of various kinds of woods for different purposes. CLARK S. ROBINSON, *J. Ind. Eng. Chem.*, 7-22, 2500 w. CJW.

Zinc Chloride as Timber Preservative. Zinc chloride useful where color or odor are objectionable or where fire risk renders use of creosote dangerous. Steeping process not as good as impregnation under pressure and zinc chloride water soluble. Wood should be sound and thoroughly seasoned. Timbers should be cut to final dimensions and boring and framing done before treatment, if possible. Timbers should soak one day for each inch of thickness and one additional day. Trade names of preservatives given. FOREST PRODUCTS LABORATORY, Note F-22, *Coal Trade Bull.*, 6-1-22, 1000 w. CJW.

Home Treatment of Lumber for Mill Roof with Creosote. Description of equipment and methods used in creosoting green lumber for paper-mill roof. Gives detailed cost table. WILLIAM E. RUDOLPH, *Eng. News-Record*, 5-25-22, 3000 w. CS.

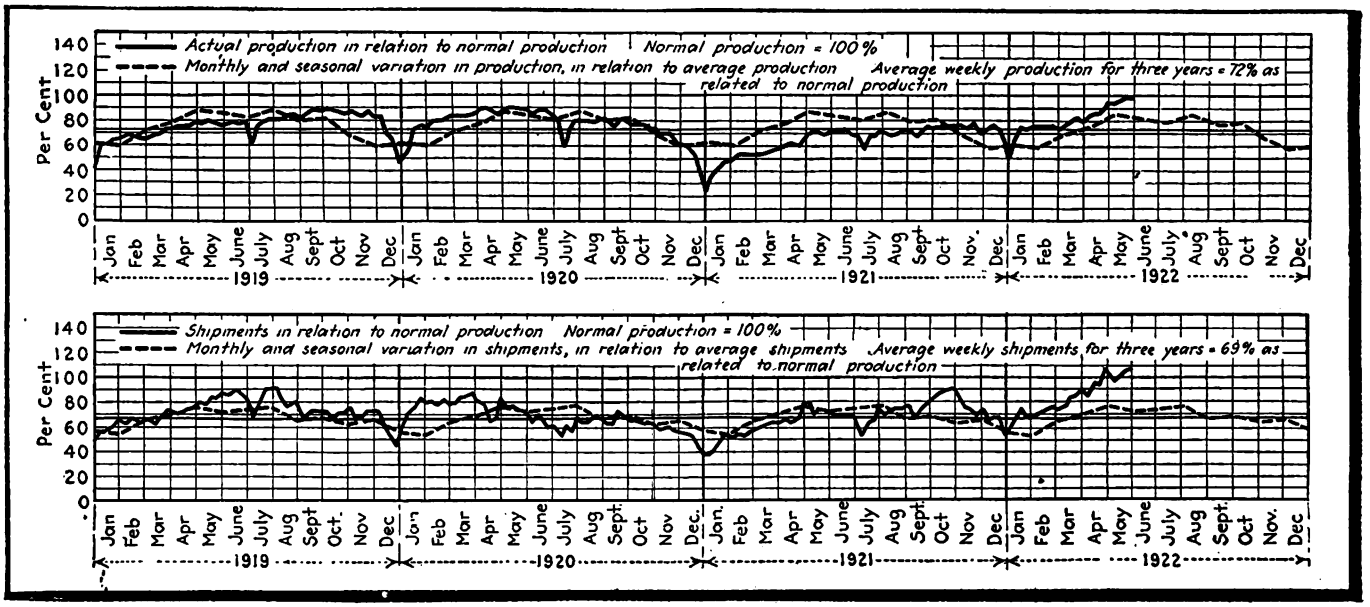
Wood Decay. Low toxicity and high rate of evaporation of crude oil from distillation of Western yellow pine make it of little value as general wood preservative. May be adapted to special uses, as in manufacture of shingle stains, preservative paints, etc. Toxicity has been determined with sawdust from three species of wood as culture media: lowland white fir, Douglas fir and sugar maple. HENRY SCHMITZ, *J. Ind. Eng. Chem.*, 7-22, 2000 w. CJW.

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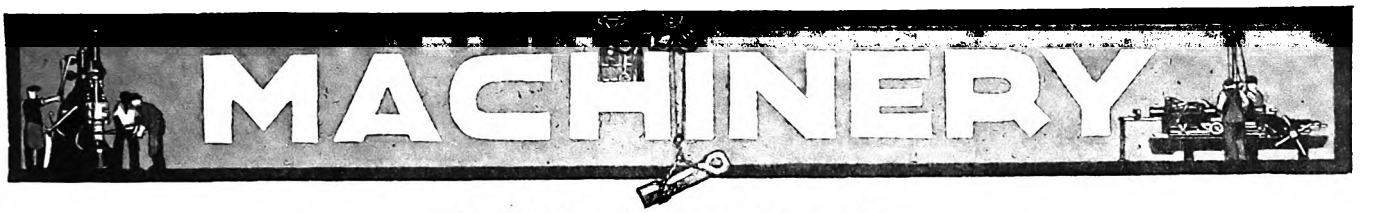
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The relation of actual production and shipments to normal production, and to average production and shipments of lumber is shown by these two three-year charts of the National Lumber Manufacturers Association. The most active period is May to August of each year. Since the middle of January, 1922, actual production and shipments exceeded the average, as based upon experience of eight years (1912-1919, inclusive); and in April, 1922, shipments exceeded normal production. The seasonal line —dotted—on the chart was obtained by averaging the monthly figures for eight years prior to 1920. Compared with this is the fluctuating continuous line of actual production or shipment. Reports of four associations of the National Lumber Manufacturers Association are included in the compilations from which these charts were graphed. The principal species represented are Southern long-leaf yellow pine; Douglas fir; Western hemlock; Western yellow and white pine and North Carolina short-leaf yellow pine.—*(Engineering News-Record.)*



No Danger of German Competition

THE present position of Germany as a competitor in the world's machinery markets has been considerably overrated by many writers, says William Althoff, of the Industrial Machinery Division of the Department of Commerce, in a special survey of the international situation. Mr. Althoff's conclusions are that America's premier position is not menaced by Germany, whose exports of industrial machinery are now well below those of Great Britain in value. The United States now occupies the favorable position in the machinery export field that was held by Germany in 1913.

During the years 1910-1913, inclusive, it is pointed out that Great Britain, France and the United States exported annually a total average of approximately $530,000,000 in machinery. Throughout this period Germany held first place, but its proportion fell from 45.1% of the total of these countries in 1910 to 43.6% in 1913. The proportion of the United Kingdom also declined continually during these years and in 1913 its share was only 28.8% as against 33.1% in 1910. The United States, on the contrary, secured a larger proportion each successive year, rising steadily from 17.1% of the total in 1910 to 20.9% in 1913. In value this represented an increase of almost $57,000,000.

Great Britain alone of the four countries showed an increase in the value of its exports for 1921, due largely to heavy shipments of textile machinery on orders that had long been unfilled. Machinery exports from the United States fell off considerably during 1921, due chiefly to the reduction in unit prices and to the exchange situation that prevailed at that time. It should be particularly noted, however, that our machinery exports last year exceeded in value those for 1918 and were more than twice as great as in 1913. The outstanding feature of the figures presented is that in 1920 and 1921 Germany, in spite of the advantages of favorable exchange rates, low wages, Government subsidies, etc., exported only about one-half the proportion it shipped during the pre-war period. Fundamental conditions at present existing in Germany are such as to seriously impair its position as a competitor in the world machinery markets. To a large extent its low costs have been the result of direct and indirect Government subsidies which the Government must necessarily abandon. Moreover, Germany is becoming sold out and the continuation of production will involve increased purchasing of raw materials from outside sources at prices which will be beyond the German buyer, although in line with world markets.

Reducing Costs by Means of Planer. The planer competes with the milling machine on some work, the shaper on other, and both are efficient, fast-working machines. The author says this is no easy problem to approach. On certain work, however, it can be shown that the planer is a more economical and efficient machine to use. A variable cutting speed is one of the first things needed, and wide range feed motion sufficient to cover heavy stock removal on the one hand and broad finish scraping on the other. Some Canadian and British examples of work done better and cheaper on the planer are given. J. G. STIRK, *Can. Machinery*, 6-29-22, 2950 w. MAH.

Saving Money by Means of the Turret Lathe. The turret lathe is showing an ever-increasing range of workability. Author tells how production may be increased on it by means of efficient chucks and work-holding fixtures, through the use of indexing devices with ample wearing surfaces, and proceeds to tell of the operations of machining a hydraulic shock absorber and a bronze valve, these being two operations in which some of the money-saving devices are used to advantage. H. ALTON, *Can. Machinery*, 5-25-22, 4000 w. MAH.

Hot Rolling of Gears. Recent development and perfection of successful process for production of gears by rolling blanks heated to forging temperature (2000-2100°F). Hot rolled gears show average superiority over cut gears of 25% in strength and 20% in hardness. Details of lowered costs of production. REGINALD TRAUTSCHOLD, *Blast Furnace & Steel Plant*, 5-22, 3500 w. APS.

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Die Design and Die Sinking. Author of this series points out in this instalment the importance of matching and aligning the dies, and the methods used to secure them against movement. Also considers minimum sizes of blocks to prevent their being driven into the shoe. He takes up the fundamental features of die design, the parting line, the kinds of hammers generally used, interlocking dies, and other topics. J. H. G. WILLIAMS, *Forging-Heat Treating*, 5-22, 3800 w. MAH.

Careful Tool Set-up Assures Better Production. A careful argument for better preliminary work, and greater care in the inspection of automatic machine tools and the progress of their work. Author points out that machines must be kept in best condition all the time, all settings should be properly made before work is started, and feeding must be effective and exact. DONALD A. HAMPSON, *Can. Machinery*, 5-11-22, 2850 w. MAH.

Punche Presses and What They Can Accomplish. There are certain principles which must be observed in order to get the most out of any machine. Author presents these for the punch press. He also shows time-saving devices, economical hub-punching dies, blanking and embossing dies, special extension gages, and the value of guards not alone for safety but for increasing production. J. H. MOORE, *Can. Machinery*, 6-1-22, 2550 w. MAH.

Different Methods of Forming Gear Teeth Profiles. An additional instalment in this valuable series. This takes up the grinding processes which are used for worms only, the production of thin gears in the punch press, stamping out gear teeth, and the classification of gears according to tooth shape. CHESTER B. HAMILTON, *Can. Machinery*, 5-25,22, 3250 w. MAH.

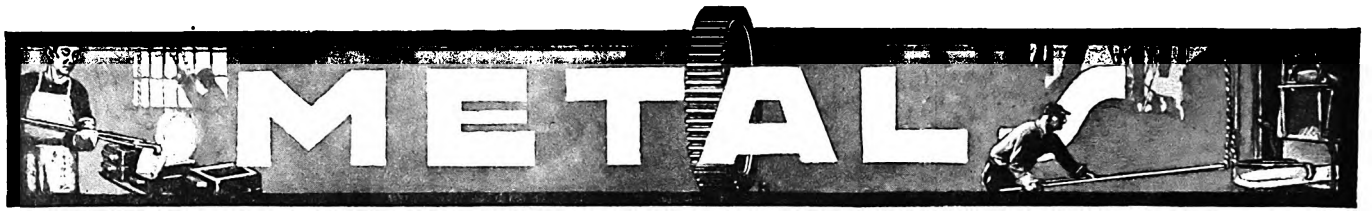
Stamping and Forging Sheet Metal in Power Presses. No tool is so widely used in the average machine or manufacturing shop as the power press. Author traces the development of this tool from the earliest days down to date, and then points out how modern tools are suitable to many different kinds of work. Describes toggle-operated blank holder, which prevents wrinkling of the work while drawing, the trimming of drop forgings, and a number of other special matters. *Can. Machinery*, 6-29-22, 1850 w. MAH.

Industrial Diamond and Its Various Uses. The bort or industrial diamond is in wide use for such purely utilitarian purposes as redressing emery wheels, carborundum wheels and the like. In this work it is a necessity, for it is the only substance available which is harder than these materials, and consequently the only one that will cut them. The author gives its occurrence in nature, practical utilization, usual sizes, suitable mountings, methods of using, and various applications. W. FURNISS CLARKE, *Can. Machinery*, 5-11-22, 3700 w. MAH.

Mechanical Technology of Forge Shop Practice. Increased attention is being paid to the technical training of young men, especially by large corporations, many of which have established schools for this purpose within the plant. This article outlines the interest being shown by manufacturers in these matters, next develops the art of welding and working iron, exemplifying general practice, and gives a model forge shop layout. Some model exercises, that is work in forge practice, are given also. *Can. Machinery*, 5-25-22, 2500 w. MAH.

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The Truth about Copper Prices

PRODUCERS of copper, zinc and brass must do something to induce retailers to sell articles made of these metals at reasonable prices if they hope to stimulate the use of their products for the manufacture of everyday articles, according to the editor of the *Engineering and Mining Journal Press*. It should be impressed upon retailers that copper and brass are not precious metals as many have been advertising them to the public.

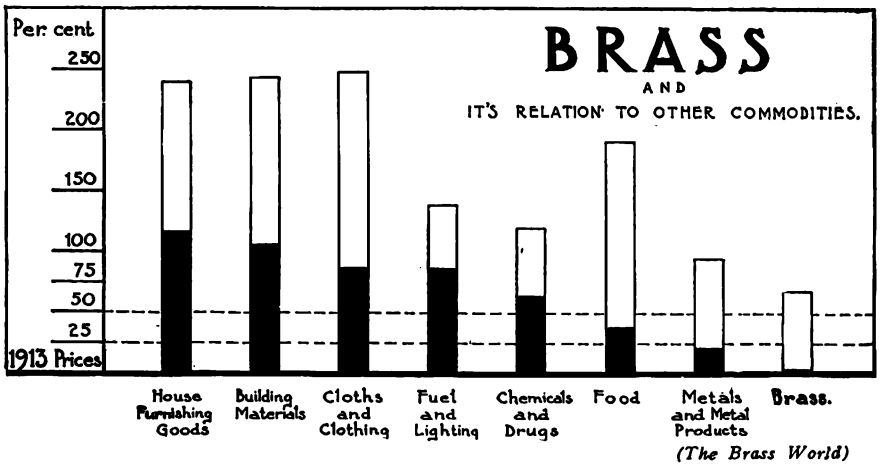
It is suggested that the Copper and Brass Association issue to the public a plain statement as to the present market prices of the base metals in which they are interested. Buying would undoubtedly be stimulated and profiteering discouraged if an advertisement were issued to the effect that copper is selling for 14 cents per pound; zinc, about 5¾ cents per pound, that brass is an alloy of the two, and that the cost of articles made of either metal should include only a reasonable charge for fabrication and marketing.

It is believed that a knowledge of the facts on the part of the buying public would make the retailers and those backing them change their minds in regard to profits. And until this happens very little can be accomplished by the "buy-something-of-copper" campaign. When a postage stamp box, for example, is sold for $4.50 the average citizen is certain to lose interest in relieving a stagnant copper market.

Determining Resistance of Metals to Wear. Account of new method, which is claimed to be improvement over that of Robin, Cary, Bauschinger and others. The machine and method consist actually of a small rotating disc of special steel, which turns at a very slow speed to prevent heating, and very fine pure quartz sand, which is fed between the disc and the specimen to be tested. The specimen must be of a certain shape, and guides are provided for the sand. None of the sand can escape. The depth of segment worn into the test piece is measured, with either depth gage or micrometer. The inventor, Brinell, takes as a measure the resistance to wear $1000/A$, in which A represents the volume of wear in cu. mm. per millimeter width of disc. He has compiled tables of values of A from segments depths from 0.01 to 2.7 mm. The method is admitted to be applicable to both soft and hard materials, and the inventor is pursuing further tests to ascertain if the same pressure can be used for all materials, and a standard depth of wear adopted for each or all materials. *Automotive Industries*, 6-8-22, 1650 w. MAH.

Corrosion of Metals. Metals rust to an appreciable degree only when they are in contact with both water and free oxygen. In all cases where water is confined in closed system free dissolved oxygen in water is either principal cause or principal contributory element causing corrosion. Removal of this oxygen will in most cases practically stop corrosion, and in other cases materially reduce corrosion caused by other agencies. Free carbonic acid promotes corrosion in presence of free oxygen, but is practically inactive in its absence except at extremely high temperatures. Other free acids, such as nitric, hydrochloric or sulfuric, will cause corrosion if in proper concentration, but in usual diluted state require presence of free oxygen in water to make their corrosive action very effective. Effect of various salts discussed. Increase in temperature increases corrosion. It is about 10 times as rapid at 180° F. as at 50°, and at 210° F. it is again about 10 times as rapid as at 180°. Gas-free water, prepared by deoxidizing or deaerating methods, is not only non-corrosive, but also prevents scoring of engines, turbines, etc., by eliminating dirt of corrosion. It also increases condenser efficiency from 20 to 25% by eliminating air blanket around tubes, without requiring any more energy to remove air before it enters boilers. Above applies to brass as well as iron and steel. PERRY WEST, *J. Ind. Eng. Chem.*, 7-22, 5000 w. CJW.

Non-Metallic Inclusions in Welding. In gas welding care should be taken to float out slag and in electric welding care should be taken in freeing from oxide layer of metal first deposited. As short an arc as practicable should be maintained so that undue oxidation of electrode may be avoided. Welding wire or electrode should be chosen on basis of freedom from slag forming elements. Carbon content should be held at minimum. Uniformity of welding material should be insisted on as of very great importance. R. O. GRIFFIS, *J. Am. Welding Soc.*, 5-22, 1500 w. CJW.



(The Brass World)

Welding of Copper. Difficulty due to rapid oxidizing of metal when heated and by its peculiar physical characteristics when subjected to heat treatment. Remarkably fine strength welds of heavy copper may be accomplished by use of oxy-acetylene torch and fusion principle of welding. Description of welding as carried out on several copper evaporators for Swenson Evaporator Co. of Chicago. A. S. KINSEY, *J. Am. Welding Soc.*, 4-22, 2000 w. CJW.

Scientific Side of Welding. Lecture, illustrated with 14 photomicrographs, comparing the micro-structure of iron steel with micro-structure of welded metal. (To be continued.) E. ATKINS, *Welding Eng.*, 5-22, 1200 w. APS.

Overcoming Defects and Failures in Welding. Allowances which must be made for expansion and contraction, methods of eliminating distortion, etc. Part welding series. M. PIETTE, *Can. Machinery*, 5-18-22, 3400 w. MAH.

Uses for Wet Asbestos in Welding. Uses of wet asbestos in making molds for castings to be used for repair work; in welding extensions on end of twist drills to prevent heating of hardened flutes, in welding pulley rims and spokes; in welding sheet metal; in welding parts in place near bolts or woodwork. *Welding Eng.*, 4-22, 1200 w. APS.

Instruction Course for Apprentices. (Article 9.) For roofing workers. Triangulation and foreshortening of lines. Application of principles or projection to the making of patterns and determination of true sizes of elements. I. C. VANASDAL, *Sheet Metal Worker*, 4-28-22, 6 figs, 1200 w. APS.

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OILS·PETROLEUM

Crude Oil Shortage Predicted

IN spite of large stocks and production of crude oil, the United States faces a shortage of oil in the near future, according to Dr. W. A. Van Der Gracht, formerly president of the Roxana Petroleum Company, American subsidiary of the Royal Dutch Shell group. During 1921, notwithstanding a decrease in domestic consumption of 5,000,000 barrels, domestic consumption and exports exceeded domestic production by 55,778,000 barrels or 152,816 barrels daily.

In regard to future requirements he called attention to the fact that present demand is chiefly controlled by gasoline consumption, which has increased 22% per annum during the last five years. He estimates that the United States will require 5,900,000,000 gallons of gasoline, which would correspond to a crude oil production of 550,000,000 barrels; in 1925, 6,800,000,000 gallons, corresponding to a production of 600,000,000 barrels of crude, and in 1930 about 8,300,000,000 gallons of gasoline, corresponding to a 650,000,000 barrel production of crude.

These estimates were based on the belief that a time will be finally reached when one-third of the crude oil produced will be converted into gasoline. Allowing for increased efficiency, both in refining operations and internal combustion engines, his estimate of domestic need for gasoline in 1930 was based on 17,500,000 cars and trucks in service that year.

Oil Industry in California. General discussion of present conditions in oil. Work is proceeding in scientific manner to conserve and intelligently utilize great source of wealth and power. Statistics regarding average daily production in various fields, and pipe lines from fields to San Francisco, etc. Systematic study of shale is under way. HENRY M. PAYNE, *Eng. Min. J.-Press*, 6-24-22, 2000 w. CJW.

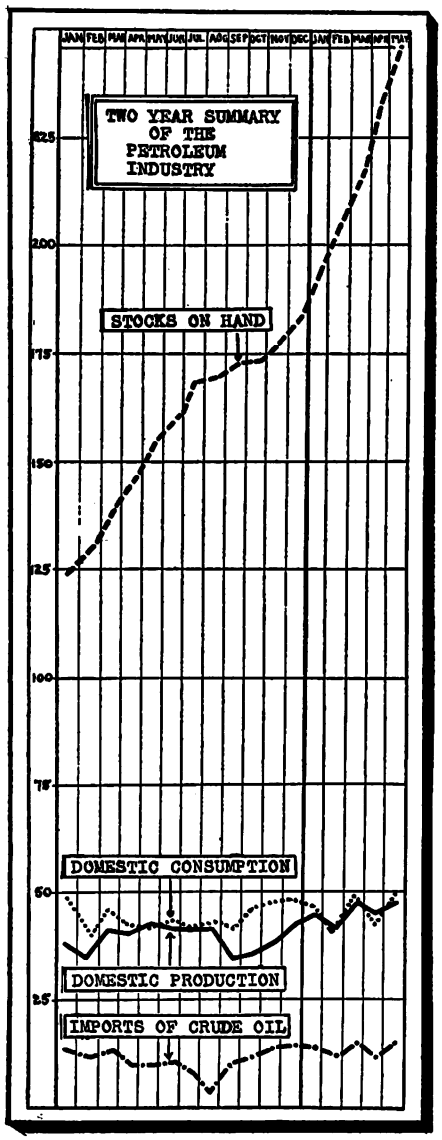
Problem of Durability Tests for Transformer Oils. Transformer oil is hydrocarbon mixture derived entirely from petroleum. Requirements are: high electrical insulating quality, ability to dissipate heat, and suitability from standpoints of evaporation loss and safety as indicated by flash point. Covers: chemical changes, tests and specifications. T. G. DELBRIDGE, *Eng. World*, 6-22, 2500 w. CS.

Finding a Suitable Lubricating Oil for a Circulating System. Method of determining suitability of oil for a given system is described. Condition of the oil must be examined. W. F. OSBORNE, *Power*, 7-4-22. IG.

Life of Buried Steel Fuel Oil Tanks. Report of investigation of tanks which had been buried from 18 months to 26 years in many differing kinds of soils. The conclusion is that steel tanks buried under favorable conditions should last more than 30 years. To accomplish this they should be coated with red lead covered with a coat of asphalt and be buried in clean sand three or more feet below the surface and be protected from ground water, and tide water, if possible. *Amer. Architect*, 6-21-22, 1500 w. EMcC.

Corrosion of Petroleum Refining Equipment. Evidence is offered to show that this corrosion is due to hydrochloric acid produced in refining petroleum and may be observed in pipe or sheet still. Ammonia introduced into vapor fractionating system of pipe stills is best combative agent thus far found. Most practical solution would be to remove salt water from crude oil as it comes from well or at least before it is put into pipe lines. R. R. MATHEWS and P. A. CROSBY, *Chem. Met. Eng.*, 6-14-22, 1000 w. CJW.

Sulphuric Acid Treatment of Petroleum. As old as industry itself. Behavior of various petroleum constituents (paraffins, naphthenes, aromatic hydrocarbons, unsaturated hydrocarbons, bituminous substances, organic acids, sulphur and nitrogen bodies with sulphuric acid. Kind of acid treatment to be used depends on constitution of distillate. Higher boiling the fraction the more vigorous treatment necessary to obtain certain color or degree of refinement. Quantity of acid required decreases with narrowness of fraction. Cracked distillates require more treatment than do natural distillates. In general acid of 60° Bé is used. General practice to apply acid used in several doses, sludge being drawn off after each dose is agitated. Temperature is very important. In most treatments acid and oil mixed by means of an air blast. Has its disadvantages and in some cases (like gasoline) acid is mixed by means of circulating pump. Length of time required to utilize full refining value of acid depends upon, among other things, method and violence of agitation, size and shape of apparatus used, viscosity of oil, quantity of acid used and number of dumps in which it is applied to oil. C. J. VON BIBRA, *Chem. Met. Eng.* 7-12-22, 6000 w. CJW.



A two-year summary of the petroleum industry.—*(Financial World.)*

Temperature Pressure Curves of Petroleum. Petroleum products with low-boiling range—casinghead gasoline and lighter motor gasolines—generate higher pressure at given temperature than water vapor. Those with relatively high boiling range—kerosene and transformer oil—generate less pressure than water vapor. In general pressures generated by petroleum products when subjected to elevated temperatures varies inversely with average boiling point of product. Of value in connection with study of pressures developed in still when gasoline or other oil is subjected to elevated temperatures. M. B. COOKE, *Reports of Investigations*, Bureau of Mines, No. 2368, 750 w. CJW.

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Ore Production Still Increasing

ACCORDING to the business review of the Federal Reserve Bank, mining operations continued to expand during June in the case of all important nonferrous metals except lead. "Copper production," says the bank, "amounted to 88,713,900 pounds, which was 16% larger than in April and about 266% greater than in May, 1921. Despite the impressive increase of production during the past three months, the general trend of copper prices has continued to be upward.

"Zinc production in May amounted to 27,419 tons, which was about 8% in excess of the April output and 51% larger than in May, 1921. Stocks of zinc continue to decline and totaled only 40,409 tons at the end of May, as compared with 83,721 tons on May 31, 1921.

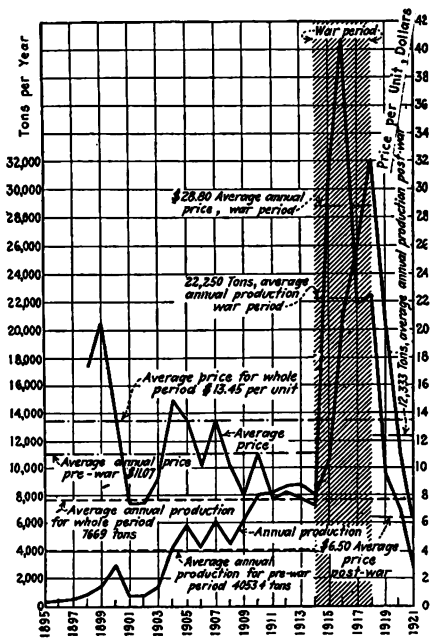
"The output of pig lead in May was about 18% less than in April, but was 12% greater than in May, 1921. Shipment of lead ores from Kansas City were somewhat greater than in April, and the average price rose from $68.27 per ton to $70.90."

Mining in Colorado. Comments on the marked decrease in output of Colorado fields from 1900 to 1921 (about $50,000,000 to $14,000,000). Analysis of situation. Colorado said to be one of greatest mining regions of world and is far from being exhausted. T. A. RICKARD, *Eng. Min. J.-Press,* 7-1-22, 1200 w. CJW.

Mining Silver in China. Description of Bawdin mine, in Burma. Early Chinese methods. Mines worked for silver alone. Smelted locally in small furnaces. Results compare favorably with modern smelting practice. Europeans became interested in 1904. Burma Mines, Ltd. formed in 1908. Today considered to be one of largest high-grade silver-lead-zinc ore bodies in world. Contains 1,000,000 or more tons of low grade material in addition to about 4,500,000 tons high grade. A. B. CALHOUN, *Eng. Min. J.-Press,* 6-24-22, 2500 w. illus. CJW.

Mine Layout. Designing of mine plan is engineering problem. Much tonnage lost by two way development. At least four years before production is sufficient to pay operating expenses. Various mine maps are given showing how efficiency of operation may be obtained. Among the problems to be considered are haulage tracks, air splits, installation of skips, etc. More knowledge of contours of coal strata desirable. If advantage can be taken of natural grades, costly and troublesome machinery at times may be eliminated. D. D. WILCOX, *Coal Age,* 7-13-22, 1800 w. CJW.

Tungsten Ores. Hamburg, London and New York are important market centers. Production has practically kept pace with consumption and increased production has been absorbed by new uses. World's consumption now estimated at about 15,000 tons per year. Requirements as to content and purity given. No accepted practice has been evolved covering premiums or penalties. Shipped in double bags, holding betwen 200 and 224 lb. per bag. Accepted measure of value is so-called unit, one unit being equal to 1 per cent. With short ton, 1 unit is equal to 20 lb. tungstic acid (WO.). Ores should be cleaned by concentration to as high above 60 per cent as possible. Higher per cent of tungstic acid less losses in production of ferrotungsten. Metals removed by electromagnetic separation. Sulfur is removed by roasting. CHARLES HARLY, *Eng.-Min. J.-Press,* 4-22-22, 2500 w. CJW.



Prices and world production of tungsten ores. See digest, "Tungsten Ores."

Hollinger Mine. This is gold mine in Ontario. Early experiences of mill are discussed, arguments being advanced for concentration. Difficulties encountered with amalgamation in presence of cyanide are enumerated, as well as apparatus troubles. Stamps are more economical than ball mills on comparatively hard ore of Hollinger and crushing in solution and sliming is superior to crushing in water and amalgamating, then dewatering and cyaniding. Filtering is considered more economical than continuous decantation. Only economy in decantation plant is simplicity of operation. P. A. ROBBINS, *Eng. Min. J.-Press,* 6-24-22, 3000 w. CJW.

Zinc Ores. Discussion of proposed commercial plant to operate electrothermic process for recovery of zinc. Oxidized ore or roasted zinc concentrate is mixed with crushed coke and with hard coal-tar pitch and formed into large briquets or ore electrodes. Baked at 450-500° C to distill off volatile constituents of pitch and make briquet conductor of electric current. Briquets then inserted between terminal electrodes of electric current and become resistors which may be heated to any desirable temperature, like lamp filament in electric lamp bulb. Flow sheet and operation of process given. Fuel or power required said to be 20% to 40% lower than for electrolytic process, while investment is about one-half. Product will be of same grade as retort zinc, since it is a distillation process. C. H. FULTON, *Eng. Min. J.-Press,* 7-1-22, 3500 w. CJW.

Pit Car Loader. One operation in coal mining which may properly be termed "sore spot" is loading of pit cars after coal has been under cut and shot down. Operations before and after this very essential act are held up, inefficiently performed and cost materially increased as result of loading delay. Good management will overcome many difficulties which lie in way of successful operation of mechanical loaders. Various classes of machines described and operating costs analyzed. R. TRAUTSCHOLD, *Coal Industry,* 6-22, 1500 w. CJW.

Face Conveyors. Conveyor failures are generally due to fact that mine is not properly organized for correct conveyor practice. Many seams less than two feet thick are profitable worked by conveyors which could not otherwise be operated. Discussion of various types which have proved most efficient in Great Britain. R. H. BRIGGS, *Coal Industry,* 6-22, 3000 w. CJW.

Mine Rescue. Brief general discussion of apparatus needed for fighting mine fires, and some of early precautions to be taken. Work should be in charge of man or department of specialist type to care for this work exclusively. Oxygen apparatus and trained crews are essential but cannot serve except in limited manner without best of facilities and equipment as outlined in various places. ORR WOODBURN, *Arizona Mining J.,* 6-15-22, 1000 w. CJW.

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How America's Leading Men Safeguard Their Health

By Frank G. Soule



FRANK G. SOULE

HOW many times have you picked up your morning paper and read something like this:

"Mr. John Smith, the well-known merchant, was stricken last night in his home with an acute attack of ———. He died before medical aid could reach him. Mr. Smith's sudden and untimely death will come as a profound shock and tragic surprise to the entire community, as he *apparently had been in the best of health.*

Mr. Smith's sudden and appalling death got into the papers because of his prominence. But for every Mr. Smith there are thousands of men and women stricken, and snatched away in the prime of life, people whose "sudden" deaths are not of enough importance as "news" to be recorded.

And Mr. Smith *apparently had been in the best of health!* But as a matter of fact his death was not "sudden." Like hundreds of men in your very community are doing today, *he had been dying for years without knowing it.* Had he taken the same precautions with his precious human machine that America's leading men now take with theirs, he might have been spared for many years of healthful, vigorous life.

For it is true that always, for months, even years, there are unmistakable indications in every person's system which show definitely and conclusively exactly what is wrong. But the pity of it is that the diseases which cause these "sudden" deaths in the prime of life, diseases that often carry off little children, almost in the twinkling of an eye, are so insidious in their attack that there is no outward symptom of their presence until the victim has passed beyond all hope of recovery. In fact, an alarming feature of these diseases is that the very poisons in the blood which cause such "sudden death" often give a fictitious stimulation which gives the victim all the appearance of good health; rosy cheeks, bright eyes and unusual energy. Yet all the time the body may be slowly but surely breaking down under the vicious influence of these unseen poisons.

Because there are 600,000 deaths in the United States each year from preventable diseases—because there are 3,000,000 people sick all the time, most of them needlessly so—because many of these insidious diseases stimulate a fancied feeling of good health and energy—because there are no outward signs which show that the system is slowly getting to the point where "sudden death" is likely: It is for these reasons that America's big men have demanded some kind of efficient protection against the lightning-like death that strikes everywhere, every day.

Fortunately there is a way to know when this unseen and unfelt disintegration has started, and there are many simple ways of checking the progress of the diseases and restoring the patient to perfect health. Science can warn you of approaching danger, protect you and your loved ones from these diseases and add, perhaps from ten to twenty years to your normal life span.

It is by the use of these scientific measures that America's Leading Men, such men as Wm. Wrigley, Jr., Carl Laemmle, President of the Universal Film Company, George Ade, the Famous Humorist, Chick Evans, the Golfer, Paul A. Harris, the founder of the Rotary idea, Justice O. N. Carter, of the Illinois Supreme Court and thousands of other men at the heads of their professions—brokers, lawyers, judges, doctors, preachers, manufacturers, builders, contractors, publishers, editors, and writers—protect themselves against, and have ample warning to ward off the slow disintegration caused by sedentary living, lack of exercise and high pressure brain work. These men—every ninety days—without leaving their offices and without spending more than four minutes each year, obtain the most thorough and complete analysis of their physical condition ever made and receive a detailed report showing exactly what may be wrong. In addition they receive a sheet of helpful suggestions for correcting the trouble and warding off the disease that might otherwise strike death into their midst, deprive their businesses of their guidance, their friends of their association and their loved ones of their protection.

A few years ago, such a service as this—by virtue of its cost and inconvenience—was out of the reach of most men. Only moneyed men could afford to undergo, at the hands of specialists, an examination which showed the exact condition of their bodies. But now, thanks to the corps of trained Scientists and specialists maintained by the National Bureau of Analysis this service has been put within the reach of every man and every woman and made available for every child at a cost which is insignificant when compared with the value of human life.

Send for Free Book on Health

Remember that personal appearance and a feeling of well-being are not always an indication of good health. Instead, the very feeling of good health and energy which you have today may presage a breakdown, possibly a long illness—possibly "sudden" death.



WILLIAM WRIGLEY, JR., president of the company which bears his name, is one of the hundreds of leading American business and professional men who safeguarded themselves against serious illness and "sudden" death.

Do not live in a fool's paradise of fancied good health. Accept the friendly warning of an unbiased and unprejudiced organization such as the National Bureau of Analysis and find out at once what is really happening to your body, unknown to you. Send at once for our brochure entitled, "Why People Die Too Young." It will not obligate you in any way. No solicitors will bother you. You will not be urged to subscribe to the Bureau's Service. But with this booklet in hand you will be better able to tell exactly whether you need such a life-saving service as the Bureau offers and exactly what it can do for you. Show the brochure to your physician if you like. Get his opinion. Then even if you do not subscribe, the knowledge gained from a reading of this valuable treatise will be of inestimable value to you. Simply fill in and mail this coupon today.

NATIONAL BUREAU OF ANALYSIS, Dept. 56
1920 Republic Bldg., 209 S. State St.,
Chicago, Illinois.

Gentlemen: I am interested in learning how to prevent needless illness and how to prolong my life. Without any cost or obligation whatever to me, please mail a copy of your valuable Treatise on Health, "Why People Die Too Young."

Name.....

Address.....

City .....



Paper Prices May Advance

ACCORDING to the official organ of the American Pulp and Paper Association, the outstanding feature of the paper market is that the falling off of orders which usually occurs at this time of year has not been as severe as in many typical years. It is believed that during the summer, production should be expanded and stocks accumulated for the bigger business that is certain to develop in the fall. Many careful buyers are placing their orders during the summer. Proof of the wisdom of this policy is afforded in the recent announcement of a price increase by one of the big newsprint manufacturers, quotations advancing $5 a ton to those purchasers who had not placed their contracts for the year at the old basis.

In a special review of the paper industry, the *Brookmire Economic Service* asserts that it is exhibiting a very healthy condition. Production is said to have increased since last July about 47½%, taking the combined total of seven grades of paper. Shipments have followed orders very closely and express an improvement in demand by about the same percentage. Paper production is said to be higher for the first four months of 1922 than for any year except 1920 and shipments show the same relationship, while stocks were lowest in April since 1918.

Rotten and Stained Wood. Wood permeated with dry rot but still quite hard and firm gave pulp much darker in color than that of sound wood, with very brown shives. Yields indicate that for every 10 cords cooked yield is one ton of air dry fiber less than it would be if wood were perfectly sound. Fiber is weaker than that from sound wood and is practically unbleachable. These facts emphasize desirability of keeping rotten wood out of digester. Staining of wood due to moisture is not of such nature as to decrease yield. Bleaching qualities vary widely with different grades of chips. Stained chips required 15% bleach as compared with 8.6% for good chips and 10.6% for average chips. If much stained wood is present, product can only be used for low-grade products. E. SUTERMEISTER, *Pulp Paper Mag.*, 6-22-22, 1400 w. CJW.

Newsprint Paper. General description of manufacturing process, article winning technical section prize, 1922 (Canadian). *Pulp Paper Mag.*, 5-18, 25-22, 2500 w. CJW.

Water Power in Pulp and Paper Industry in Canada. Largely statistical information regarding pulp and paper mills in Canada operated by water power and those by purchased hydro-electric power. The aggregate is 476,503 hp., while the hydro-electric power is 160,577 hp., or a total of 637,080 hp. Of total water power installation 178,911 is converted into electrical energy before use in mill. Future power requirements are also discussed. *Paper*, 4-19-22; *Pulp and Paper Mag.*, 5-11, 18-22, 2500 w., Tables, CJW.

Pulp Stones. Anticipate your pulpstone requirements and season them before placing them in grinders. Should be seasoned one year, but large stones for magazine grinders should be seasoned at least two years. Right kind of stone, properly seasoned, will give months of service, whereas green stone, full of quarry water, is likely to last but few hours. W. T. SMALLWOOD, *Pulp Paper Mag.*, 6-22-22, 250 w. CJW.

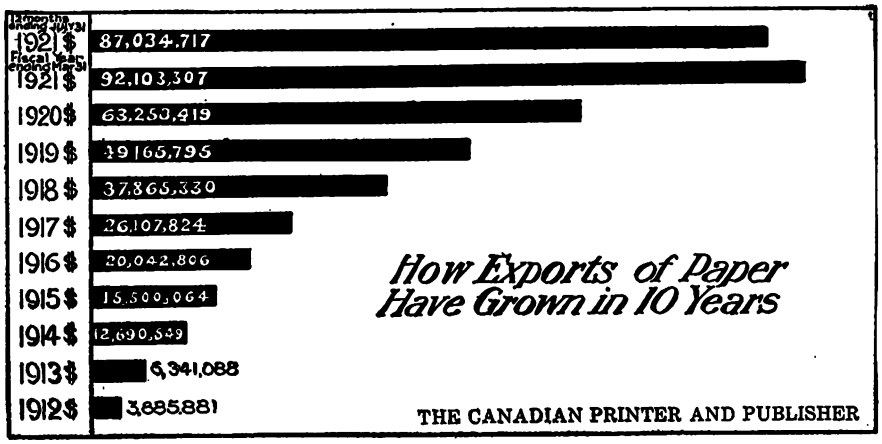
Plain Wall Losing Popularity. Color essential in home; can best be secured through medium of wall paper. Variety in present designs of wall paper offers interesting possibilities to decorator. Texture in wall paper breaks up light falling on it; sensation of comfort, warmth, etc., obtained, according to scheme of colors used with this texture. Use of color suggested for rooms in hospitals: dull French gray tile for wainscot and lighter gray for reflecting surfaces above suggested for color treatment of operating-room. EDWARD H. HALL, *Wall-Paper*, 5-22, 1500 w. HHH.

Paper Mill Lubrication. Covers lubrication requirements of paper mills, tests for grease, lubrication of dryer bearings and beaters. T. C. PORTEUS, *Eng. World*, 6-22, 2500 w. CS.

Problems in Cellulose Chemistry. Translation of address by Heuser, in which he points out some questions in constitution of cellulose which must be solved. These theoretical problems are becoming more important to fundamental study of paper making questions. *Paper*, 2-8-22; *Pulp Paper Mag.*, 5-11-22, 1800 w. CJW.

Brief Treatise on Color. Good paper is first requisite of successful color scheme. Enamel papers should be studied for surface and tone; tone changes printing effect. As proper red used with black is yellow red, cream stock for two-color work of this kind is preferable. Flaming red excellent for decorative purposes, but not always desirable with black on white stock. Any 50 value color usable with black on white stock as decorative color, but area of decorative color should be inversely proportional to its chroma. Rules of equal contrast may be applied in selecting color scheme by analogy, contrast and balanced contrast. First is simplest method. Includes varieties of same color; second includes compliment or hue immediately to right or left of compliment, as one of colors; in third, second color is neither analogous nor contrasting to first color, but held in place by third color to avoid simultaneous contrast. Analogy of hue and value is surest road to harmony, though contrast and balanced contrast more interesting. E. C. ANDREWS, *Amer. Printer*, 5-5-22, 2000 w. MBB.

Recovery and Its Control. Efficient recovery system should include venturimeter to measure all liquor pumped from wash pans to evaporators which, with average test of soda content, will give pounds of soda delivered from wash pans. Should also make occasional tests of rotary flue gases to determine loss of soda up stack. Method given for figuring actual recovery and control system discussed. Secret is: "Watch leaks and do not allow soda to get away." G. K. SPENCE, *Paper Trade J.*, 4-13-22, *Paper Mill*, 4-15-22, 1000 w. CJW.



Remarkable 10-Year Growth of Canada's Paper Exports

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POWER *The Overshadowing Problem of the Day*

THE generation and application of power is always the big factor in an industrial enterprise—the mainspring of the works, so to speak. Important as power is in normal times, the coal strike and the slow-up of the railroads makes it the overshadowing problem of the day. Now, more than ever, is the time when the industrial executive must know the most economical methods of making and using power, if he would offset the effects of the almost-assured fuel famine that lies just ahead. Fortunately the help of experts in the power field is available to everyone, and at a nominal cost. Below is a selected list of authoritative books on power in its many forms and uses. This list is merely suggestive of the large number of books on this subject that can be obtained promptly from the Book Department of THE INDUSTRIAL DIGEST. If you do not find what you need below, describe your wants in a letter to the Book Editor.

AMERICA'S POWER RESOURCES, *by Chester G. Gilbert and Joseph E. Pogue.*

The economic significance of coal, oil and waterpower. 325 pp. $2.50, postpaid.

THE POWER PLANT LIBRARY. Covers the whole field—mathematics, engine running and repair, valve setting, boilers, pipes, pumps, shafting, belting, governors, turbines, refrigeration, electricity. 8 vols., 3000 pp., 1200 illustrations and diagrams. $14.50, postpaid.

MECHANICAL MOVEMENTS, POWERS AND DEVICES, *by Gardner D. Hiscox.*

1890 engravings of mechanical motions and appliances accompanied by appropriate text, making it a book of value to the inventor, the draftsman, and to all readers with mechanical tastes. 400 pp., $4.00, postpaid.

POWER PLANT TESTING, *by James A. Moyer.*

A complete treatise on the generally-approved methods used for testing engines, turbines, boilers and the auxiliary machinery found in the average power plant. Describes also kinds of apparatus used in testing. 486 pp. $4.00, postpaid.

MECHANICAL STOKERS, *by Joseph G. Worker and Thomas A. Peebles.*

Opinions and facts from actual field experience in the design, installation and operation of stokers, a discussion of combustion as it applies specifically to stoker work, an outline of the factors affecting the selection of stokers for differing conditions and widely differing fuels. 258 pp., 109 illustrations. $3.00, postpaid.

COAL MANUAL, *by F. R. Wadleigh.*

Coal fields of the world: production, analysis of purchase, specifications, what they should cover, Btu. method of purchase and penalty; preparation, cleaning, washing, transportation rates. Uses of by-products: coke, gas manufacture, gas coal, requirements, producing districts, analysis. Gas producer, pulverized coal, briquettes. Anthracite, coke, beehive, by-product, uses, diagram of by-products, boilers, furnaces, suggestions for firing, stokers, combustion, storage, spontaneous combustion. 184 pp. $3.50, postpaid.

STEAM POWER PLANT AUXILIARIES AND ACCESSORIES, *by Terrell Croft.*

Practical information on how to locate and remedy troubles in direct-acting steam pumps, crank-action pumps, centrifugal and rotary pumps, injectors, pump governors, feed-water heaters, fuel economizers, condensers, steam piping, steam separators, steam traps. Directions for installation, operation and care of such equipment. 477 pp., 402 illustrations, $3.00, postpaid.

STEAM BOILERS, *by Terrell Croft.*

The advantages and disadvantages of powdered fuel, when it pays to use fuel oil, how to select the right type of boiler, what it pays to know about boiler construction and operation, practical aids to efficient boiler management, how to cut fuel costs, information on combustion, on boiler capacities and ratings, and on feed water treatment. 412 pp., 514 illustrations, $4.00, postpaid.

BURNING LIQUID FUEL, *by Wm. N. Best.*

Liquid fuel, its origin, production and analysis, atomization, oil systems, refractory material, equipment for various industries, etc. 340 pp. $5.00, postpaid.

PRINCIPLES OF MECHANICAL REFRIGERATION, *by H. J. Macintire.*

The book starts in with the A B C's of the subject and then step by step shows how to operate refrigerating machinery and discusses the problems the refrigerating engineer must meet in his everyday work, 255 pp., 114 illustrations, $2.50, postpaid.

HYDRAULICS, *by Horace W. King and Chester O. Wisler.*

An authoritative reference book for engineers who are interested in the fundamental principles of hydraulics, and a textbook for beginning courses in the subject. 237 pp., 133 figures, $2.75, postpaid.

Book Department, INDUSTRIAL DIGEST

25 West 45th Street, New York City

PRINTING PUBLISHING

What Constitutes "News"?

IS it true that stories of crime dominate the newspapers? The charge has so often been made that not only the general public, but newspaper men have come to accept it as truth. But figures recently presented by Prof. Bristow Adams of the New York State College of Agriculture effectually refute this theory.

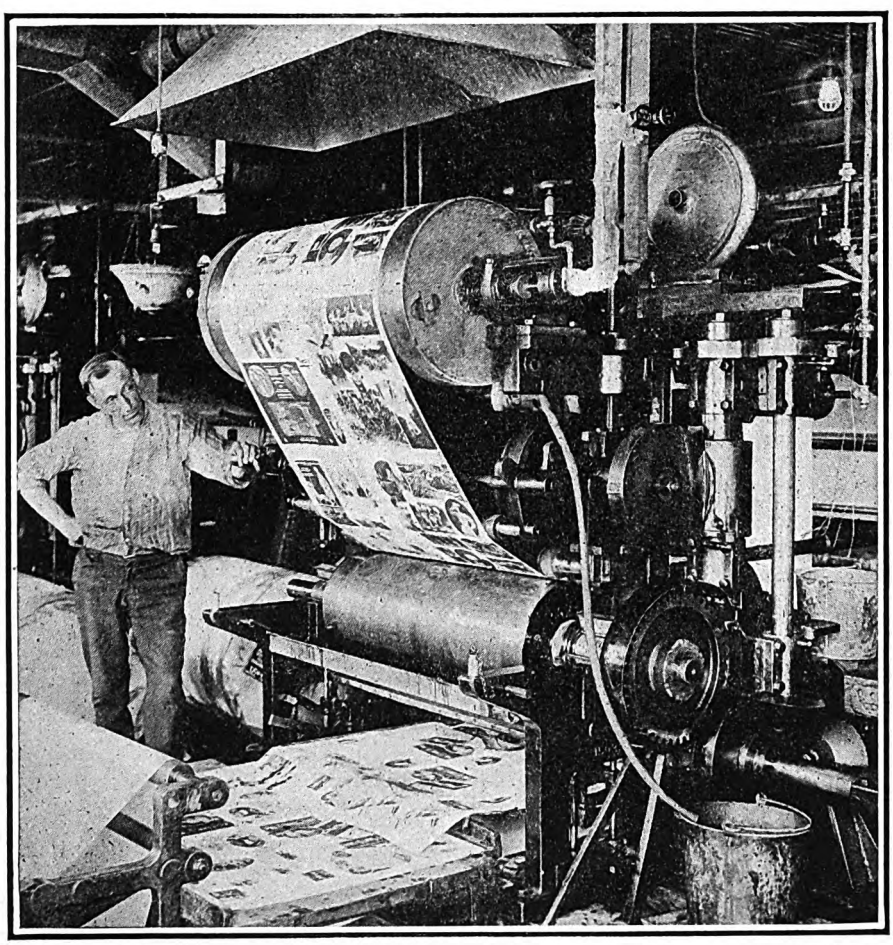
In three representative newspapers of the metropolitan district of New York City, Prof. Adams found crime to stand seventh in news importance, as judged by the amount of space given to it over a month's period, a total of 4½% of the grand total. It was topped in the same papers by business and finance, sport, foreign, educational, government and politics and labor news, in the order named.

In cities of the second class in New York State, crime made even a smaller showing. In those cities it occupied the tenth place with a total of 3½% of the whole and was topped by sport, educational, society, labor, business and finance, government and politics, agriculture, foreign, and death and disaster news.

In cities of the third class, Prof. Adams found that crime news was eleventh in importance, with a total of 1¾% of all text matter printed.

Editor and Publisher, in commenting upon this showing, remarks that newspapers and newspaper men can render a real service in combatting false opinion by making known the truth in regard to crime in the news.

Problems and Production of Big Printshop. Well-known American printer wrote Director of Budget that his plant was doing about same volume of yearly business as Government Printing Office, and with 2000 employees less. Brought out fact that there is little in common between demands Government Printing Office meets and requirements of commercial establishment. Government has 85,000 different jobs yearly, 152 presses, including almost every model built since Civil War, only seven of 64-page capacity. Private plant, with less employees, easily attains output of mail-order catalogs, telephone directories and other big editions, equal in value to vastly different work requiring more employees, put out by G. P. O. This also has no control of volume of printing ordered and must have sufficient force to carry peak load. Printing of patent specifications keeps 40 linotypes busy daily in G. P. O. Such unusual tasks add special work and problems in bindery department. GEORGE H. CARTER, *Amer. Printer,* 5-6-22, 1000 w. MBB.



A close-up of a rotogravure printing press, showing one of the two copper cylinders over which passes an eight-page roto section of a newspaper. The paper passes from the copper cylinder over the big roller at the top and thence to another copper cylinder in the rear, which prints the other side of the paper.—*(© Galloway.)*

Left to Right, Right to Left. Hebrew is read from left to right. To give characters this sequence in print, type must be reversed after being set. Division of word is not allowed. To complete word certain letters are at times dilated. Method in Germany is to borrow letters from next line to fill out measure, same letters being again used in their proper place. All Semitic tongues always been written in this manner, including Arabic, which is tongue of hundreds of millions of people. *Amer. Printer,* 5-20-22, 1500 w. MBB.

Unit Presses Can Be Connected Up for Every Newspaper Emergency. Varying load of advertising throughout week and many-sectioned Sunday editions require flexible layout of printing and folding machinery. OSCAR C. ROESEN, *Editor and Publisher,* 5-3-22, 900 w. MBB.

How Halftones Are Made. Description of the half-tone process from first to last step, covering the latest methods in straight work, including the screen, negative, developing, stripping, printing on copper, re-etching and finishing, and the different styles of finish: close-cuts, vignettes, combinations, overline or "highlight" plates, surprints, bendayed plates, direct photography and retouching. Intended primarily for buyers of engravings. H. W. WADLAND, *Canadian Printer and Publisher,* 6-22, 4000 w. WRB.

The Artistic Lithograph. Must be conceded to be the best available form of graphic expression. *Natl. Lithographer,* 5-22, 700 w. MBB.

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After the Showdown

The great "buyers' strike" of 1920-21, a never-to-be-forgotten event in the economic history of this country, proved a point which must henceforth be recognized as basic and incontrovertible.

It was discovered by merchants and jobbers everywhere, in practically every line of merchandise, that it was the trademarked and adequately advertised brand of goods that got the lion's share of the business there was to get, while the preponderant loss of sales fell on the unbranded and unadvertised goods.

This was a great "showdown" for Advertising. Its position as a factor in economic life was on trial. Had it really done what had always been claimed for it? Had it created consumer preference that would hold against the keen competition of a sacrifice price on unmarked goods?

The verdict of the buying public was unqualified. It was not a straw vote to determine popularity. It was the final test of willingness to buy. The ballots were dollars. And the preponderant majority voted with their dollars that they preferred to keep right on buying advertised goods.

With the whole country on a reduced schedule of production and sales, the factories that were able to keep on producing, in anything like normal quantities, were invariably those making trademarked and nationally advertised goods.

All over the country today manufacturers, jobbers, and merchants are giving serious consideration to this important and conspicuously demonstrated fact: the public prefer to buy nationally advertised brands of merchandise. And public demand is the last word in all economic situations. No one can go against it and long endure.

This will mean, then, that more and more manufacturers will seek out ways to make their products worthy of a distinctive trademark and a sustained plan of advertising. It will mean that merchants will more and more give preference in their stocks of advertised brands. It will mean that the jobbers will more and more arrange to supply the merchant with advertised brands.

But new advertisers, manufacturers who are finally convinced that their future lies in the direction of an advertised product, will discover that the magic power of advertising cannot be applied overnight. It may require sustained effort to attain a position of equality with competitors who have been advertising for many years. This will be an unwelcome discovery. But it will be found to be the truth, and will be their only hope of gaining a substantial foothold in what, from now on, must continue to be a more keenly competitive market than we have known for a generation.

[Published by THE INDUSTRIAL DIGEST in co-operation with The American Association of Advertising Agencies]

SUGAR-CONFECTIONERY

Sugar Prices to Remain Firm

ACCORDING to recent estimates of crops and a survey of the sugar market, it appears that there is to be neither a shortage nor any appreciable rise in price in the near future. The latest estimate of the world's production for 1921-22 shows an increase of 500,000 tons, as compared with the previous year. While some estimates of the Cuban crop place the production considerably under last year's figures, it is generally believed that the Cuban figures will not fall so far short as to furnish any argument for higher prices.

A writer in *Candy Manufacturer* points out that in considering further advances in price there are several important factors to be considered. In his opinion holders of sugar on the Western hemisphere, excluding Peru and Brazil, cannot ignore the natural drawing power of higher prices from other parts of the world. The present price has already induced increased competition from distant countries, particularly to European markets. Exchange rates constitute another important factor. Foreign buyers in countries of currency depreciation hesitate at the prospects of operations which promise only limited profit.

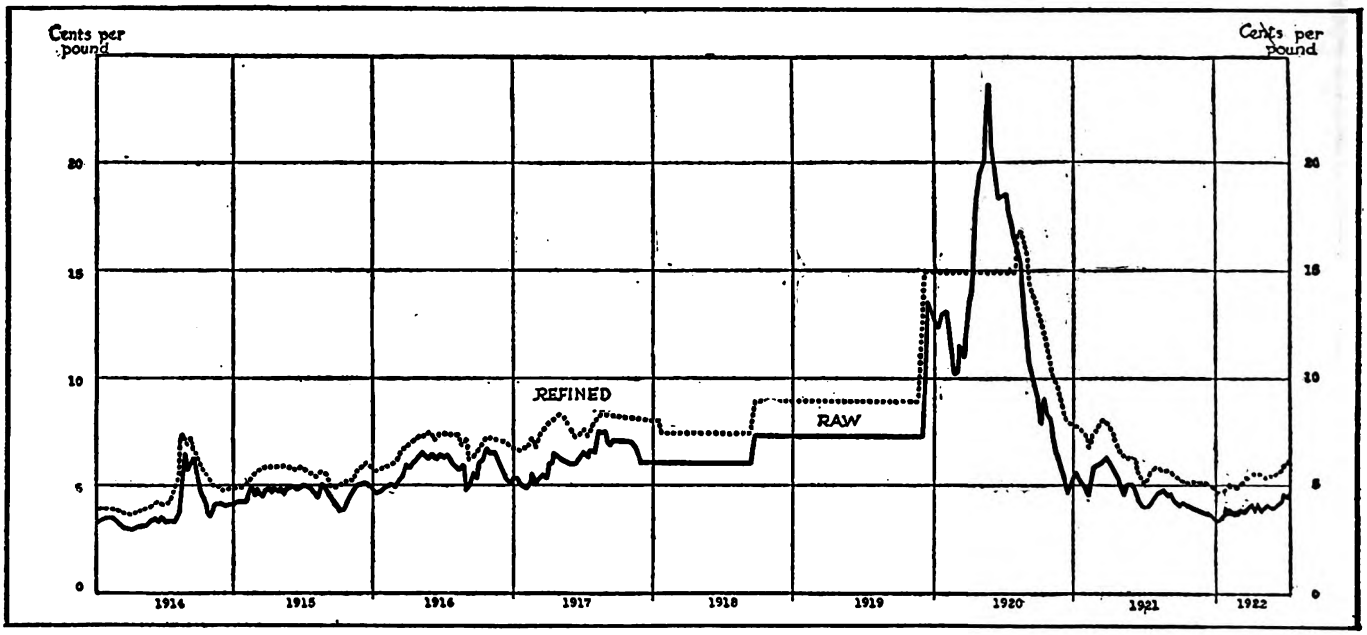
There will be a market for all the sugar produced this year, but demand will not be enough to encourage high prices.

Invert Sugar. Invert sugar has definite place in confectionery industry. In hard candy a definite quantity must be present to prevent graining but an excess will cause stickiness. May be prepared by use of invertase or acid. Hydrochloric acid most convenient one to use. With invertase, 95 lbs. cane sugar and 27 gallons of water are slightly acidified with acetic acid, brought to 125°F and treated with 1-2 pints of invertase solution and temperature maintained for 15 hrs. With hydrochloric acid, 1960 lbs. cane sugar is made to 36° Bé solution, brought to 158-160°F, 3 lbs. pure acid (density 1.19) added and the whole heated not higher than 167° for 1 hr. 20 min. Then 4.8 lbs. dry sodium carbonate (or its equivalent) are added. In both cases the product must be concentrated. F. W. MURPHY, *Candy Manufacturer*, 7-22, 1000 w. CJW.

Sugar Deterioration. Continued article. Two important factors are moisture content and degree of infection. Experiments on influence of superheated steam in centrifugal caused diminution of 99.47% of bacteria and 98.28% of molds. Treatment also influences keeping properties of molasses. Advantages are simplicity in construction and operation, economy in equipment, installation and operation, efficiency under all conditions, and cleaner wash. N. KOPELOFF, *Sugar*, 7-22, 2000 w. CJW.

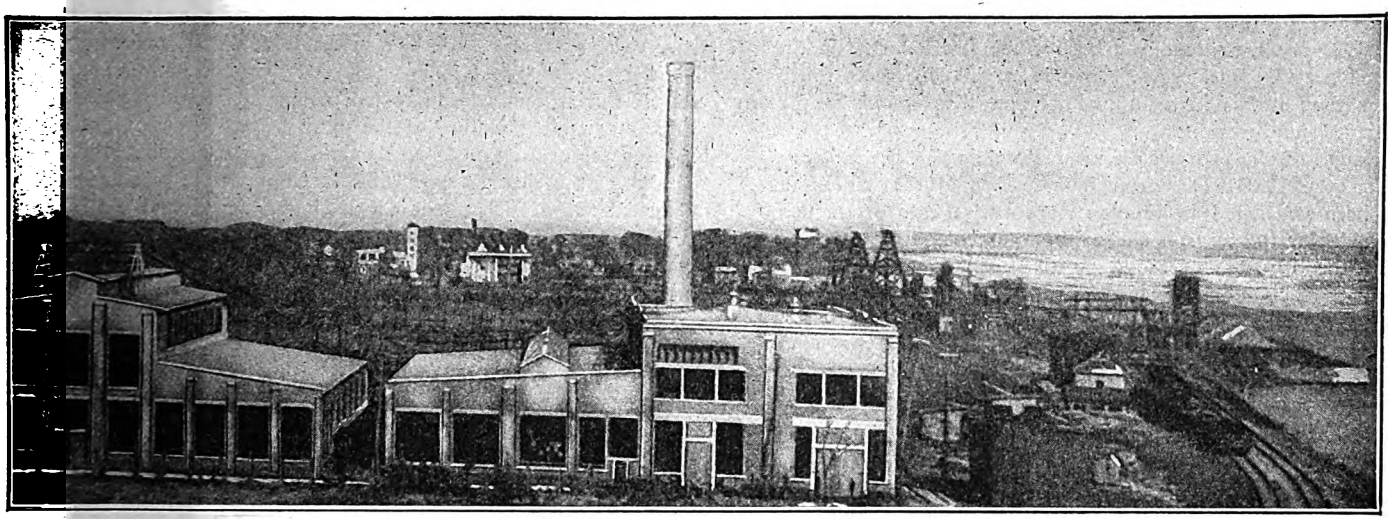
Sugar Beet. General discussion of method of cultivation. Suitable soil and subsoil one of first requisites. Best results obtained by fall plowing. Disc harrow gives good results both before and after plowing. Special drill may be used, sowing seed 20 in. apart. Other instruments named. Special harvesting machine removed beets from ground, tops them and piles roots. Live stock valuable part of farm, because they do the work, utilize beet tops and pulp and produce fertilizer. C. O. TOWNSEND, *Sugar*, 6-22, 1800 w. CJW.

Molasses as Feed. Continued article. First feeds consisted of 80% molasses and 20% peat moss, but very little used today because moss is injurious. Best feed consists of 50% molasses and 50% of various dry substances in pulverized state. Present output in France is about 50,000 tons. PIERRE GIRON, *Sugar*, 7-22, 2000 w. CJW.

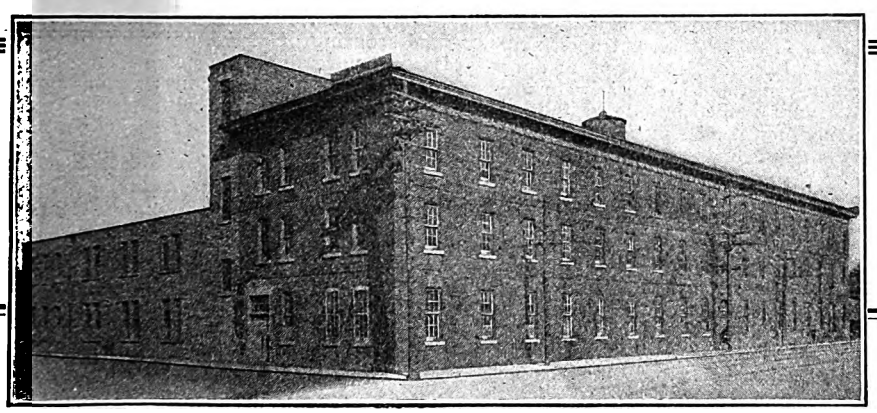


The Sugar Industry Turns the Corner

The very considerable recovery in the sugar industry which has occurred this year is made clear in chart above, which represents price of Cuban raw sugar, duty paid at New York, and that of corresponding refined product. At close of last year, duty paid Cuban raws declined to a low of about 3½ cents a pound, while the price of these sugars before payment of duty fell to 1¾ cents. The decline, which was attended by great suffering in Cuba and heavy losses to most sugar companies, was partly an aftermath of the collapse of 1920, but was also caused by a large carryover of Cuban sugar and an ill-judged attempt to control prices by a Cuban commission. With a free market restored at the first of this year, however, jobbers and dealers again had confidence enough to replenish stocks, which were estimated to be a half-million tons below normal. Foreign buying also developed well. As a result, the Cuban carryover of upward of 1,000,000 tons has been disposed of, and, in addition, considerably more than half of the new crop. Cuban raws, cost and freight at New York, meanwhile have risen to slightly more than three cents, with corresponding advances in the refined article. The prices plotted were tabulated by Willett and Gray.—*(N. Y. Evening Post.)*



PETER LYALL PLANT



Peter Lyall Plant to be sold on premises at 10 A.M., Sept. 5.

Munitions and Machinery Plant to be sold on premises at 3 P.M., Sept. 5.

FACTS ABOUT THE TWO PLANTS

Peter Lyall Construction Co. Plant

Situated on St. Lawrence River, three miles from center of Montreal.

Sidings connect with Canadian Pacific, Canadian Northern and Grand Trunk Railways.

Channel 25 feet deep permits loading ocean going steamships.

Four buildings of steel, brick and concrete, built in May, 1918. Main building (two-story), 184-448 sq. ft.; Forge building, 42-328 sq. ft.; Electric and Power Building, 20,400 sq. ft.; and Heat Treating building, 13,175 sq. ft. Floor load, 350-400 lbs. a sq. ft.

Munitions and Machinery, Ltd., Plant

Situated at 17th Ave. and Notre Dame St., Lachine, 7 miles from center of Montreal.

Siding connects with Canadian Pacific and Grand Trunk railways.

Plant about half-mile from St. Lawrence River.

One three-story Main building, with one and two-story additions; brick; 42,000 sq. ft. floor. Floor load, 250-300 lbs. a sq. ft.

All figures on both plants are approximate.

WRITE FOR FREE BOOK

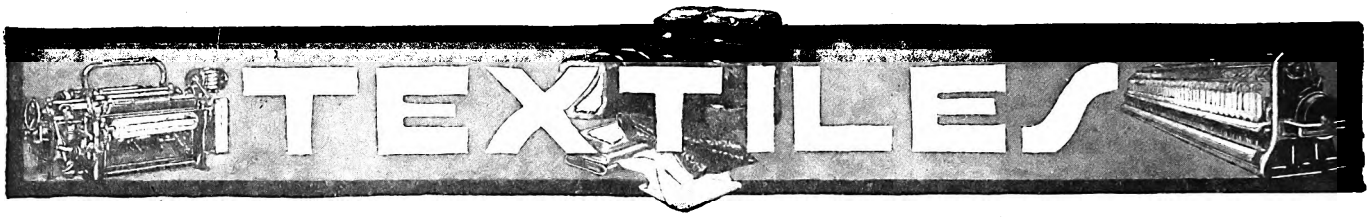
A large prospectus containing floor-plans, photos and full data on these two plants will be sent on request. Communicate at once with

Quartermaster General, U. S. Army
Munitions Bldg., Washington, D. C.,

or

Gerth's Realty Experts, Auctioneers
101 West 42nd St., New York City

ARTMENT



Outlook for Silk Industry Encouraging

ACCORDING to *Silk* the prospects for the season of 1922-1923 are exceptionally good for the silk industry in the United States. Business in broad silks and ribbons is much better than it has been in months and the outlook is for continued improvement.

In spite of the poor conditions maintaining in the industry during the 1921-1922 season it is estimated that sufficient has been consumed to represent the entire raw production available for that season and a large percentage carried over from the 1920-1921 season. With business generally improving throughout the country, it is believed that the industry will require as much raw stock as during the past year. There is very little silk available for carry-over into the new season and it is not expected that the new season crop of raw silk will be increased to any appreciable extent.

The outstanding feature of the market for the past month has been the continued strong demand for 20/22 denier silks. Supplies of this description in old season stock are practically exhausted and new-season is not yet here. As a result 20/22 deniers are held generally at a premium of 20 to 25 cents over 13/15s, while in some cases, where immediate delivery was required, considerably higher premiums have been paid.

Colored Cotton Goods. Various systems for producing colored cotton goods are bleached, dyed, filled, painted, stained, embossed, enameled and printed. Brief discussion of uses of different classes. In large mill where various methods are used, well to bear in mind difference in cost and to make other comparisons. Some processes are cheaper and some produce less attractive goods. Brighter colors are vastly improved by having yarns bleached bottom before drying. Many colors cannot be so well brought out when stock is raw stock-dyed. Examples are cited. Progress schedule for goods shown. Enables cost, time of delivery and other facts to be determined at glance. H. D. MARTIN, *Textile Colorist,* 7-22, 1200 w. CJW.

Bleaching Cotton Piece Goods. Early bleaching methods. Nature of cotton. Sizing must first be removed, which may be accomplished by enzymatic action (diastase) or by boiling in kier with caustic soda or lime. Various types of kiers. Chlorine most important bleach, and is used as bleaching powder or liquid chlorine. Liquid chlorine has many advantages, among which are: sodium instead of calcium salts are used, thus forming a soluble salt later in process; liquid is stable, whereas bleaching powder slowly deteriorates; greater convenience in handling; more durable whiteness formed; tendering is less frequently found in goods. No appreciable difference in cost. Strength of bleach must be kept constant. (To be concluded.) W. A. BAILEY, *Canadian Dyer and Color User,* 6-22, 2500 w. CJW.

Dyeing Wool as Raw Stock. Production and quality of work in handling raw stock depends to large extent upon skill of individual dyer. Description of open tub or kettle method. Necessary to use chrome colors applied by one of following methods: Chrome mordant or bottom chrome methods, chromate method and after chrome or chrome top method. Discussion of these methods. Machine dyeing has been suggested and while they save labor and increase production, do not produce evenness of shade and penetration that is obtainable in open tube. RALPH J. BATTYE, *Am. Dyestuff Reporter,* 6-19-22, 1500 w. CJW.

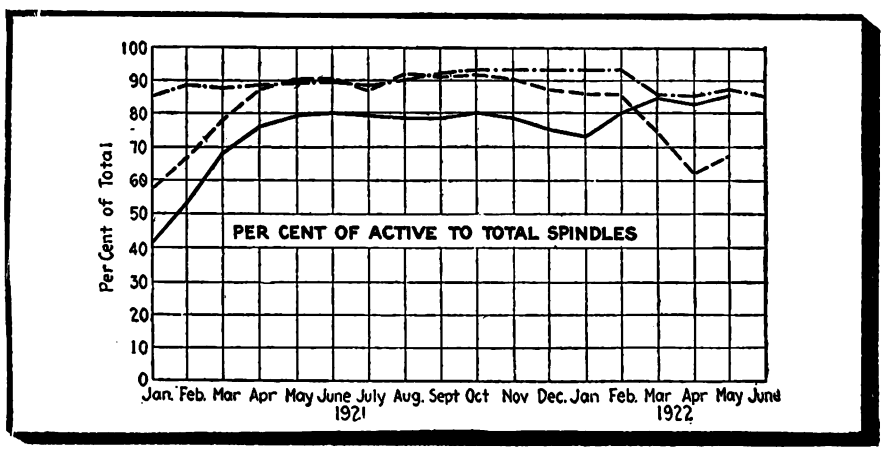
Raincoat Fabric. Worsted fabric better than cloth of carded wool because combing process makes yarn smoother and straighter than carding. Cotton can be made to resemble worsted closely in mere appearance and is commonly used with worsted to cheapen cost. Less efficient because damp cotton is comparatively hard to dry and lacks lift of all-wool goods. Construction layout and weave for lightweight fabric made from 2-ply cotton warp and single worsted filling are given. Also finishing operations. *Textile World,* 7-8-22, 1200 w. CJW.

Scouring Worsted Goods. Brightness of colors and handle of woolen or worsted fabric depends largely upon final scouring of pieces, object of which is to remove dirt, oil, etc., without injuring fibers. Four methods: mechanical scour, solvent scouring with benzine or gasoline, emulsification scouring and saponification scouring. The last is thoroughly efficient scour and has unique property that it can be justified scientifically at every point. Seems desirable to take as standard form of scouring. JOHN SCHOFIELD, *Textiles,* 7-22, 1200 w. CJW.

The volume of raw silk shipments from Yokohama in March was 16,667 piculs, according to the Yokohama Custom House. This was an increase of 2,757 piculs as compared with the corresponding period of 1921, but in comparison with February this year, the figure was a decrease of 1,465 piculs.—*Pacific Ports.*

Dyeing and Bleaching. Dyeing operation takes place during process of bleaching, accomplished in about ¾ hr. Loss in tensile strength of material is substantially decreased and product is of superior grade both in quality and appearance. Bleaching agent consists of sodium peroxide, soda ash, Glauber's salt, common salt and sodium hydroxide. The dye mixture is added to this, after which the vat containing material is boiled for ¾ hr. Fullers earth added to dye acts as resister, softener, filler, leveler and finisher of goods dyed as well as to give weight. *Textiles,* 7-22, 500 w. CJW.

Filing Sample Dyeings. Sample cards shown, on which all information regarding dye may be recorded: class, name, maker, price, and dyeing qualities. Facilitates comparison of various dyes, specially if sample of dyeing it attached. Might be adopted by manufacturers. E. W. ADAMS, *Am. Dyestuff Reporter,* 6-19-22, 750 w. CJW.



Monthly percentage of active cotton, woolen and worsted spindles to the total in place as reported by the Bureau of Foreign and Domestic Commerce.—*(American Machinist.)*

Topping. Continued article. Directions for topping cross dye colors with aniline black. Top-chroming may be used for shading dyed wool in blacks and blues though it is little used at present for fancy shades. Has advantage of shortness and color may be better than if dyed on chrome mordant. Shading of acid colors and brightening sulphur blues discussed, as well as method of improving direct cotton colors. Loaded blacks (wool) are produced by heavy final dyeing. Foundation of indigo used and logwood applied using copper as process of bichromate. Directions for applying logwood, which is important part of operation. GEORGE EMMONS, *Textile Colorist*, 7-22, 3000 w. CJW.

Defects in Dyed Yarns. Chief general faults of yarns delivered to dyer and bleacher are: Dirt and oil stains, stripy yarns (whether optically visible or not, specky) containing dead cotton, with no affinity for certain colors, irregular gassing yarns, irregularly spun or double yarns. Faults commonly found in cops and cheeses are: Wound too tightly, soft nosed, cops built up on perforated but non-absorbent tubes, and careless handling and packing. Essential of beam dyeing is perfectly evenly tensioned beam. Ball and cheese warps also discussed. Relation of these defects to dyer. GOODALL, *Southern Textile Bul*, 6-29-22, 2000 w. CJW.

Mordants. Continued article. Tannins one of most important classes of auxiliary substances used in dyeing. Tannic acid most important of tannins. Sources, properties, method of calculating specific gravity of solution of tannic acid, and uses. Best absorption of tannins secured by introducing goods into boiling water and allowing to cool for three hours, using as strong solution as possible. Acetic acid promotes absorption of tannin by cotton. For ordinary shades use 2000 to 3000 parts water and two to five parts of tannic acid per 100 parts goods, while for very dark shades five to ten parts of tannic acid should be used. JAMES STEELMAN, *Textile Colorist*, 7-22, 3000 w. CJW.

Wood in Dyehouses and Bleacheries. Defects of wood due to cross grain, spiral grain, knots, frost splits, insects, fungus, etc. are discussed in their relation to properties. Roof timbers should be treated. Methods of treating wood with creosote. Pointed out that treated wood is heavier and needs better supports than untreated. JOSEPH WOODMAN, Textile Colorist, 7-22, 2500 w. CJW.

To Insure Profits

Plan Your Budget on Sound Cost Accounting

"It is one thing to make the Plan quite another to work the Plan"

PROFIT, in a large measure, is the elimination of LOSS. To be eliminated, Loss must be accurately detected.

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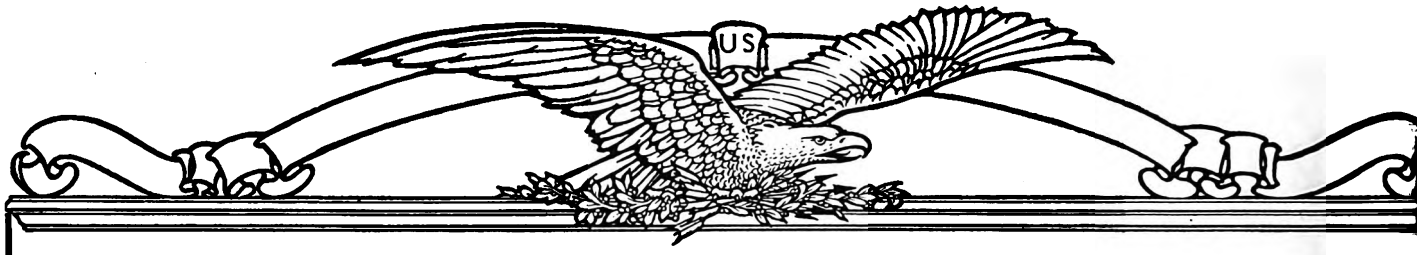
Outlook for Fall

(*From page 1347*)

"The conclusion that further advance will follow may be supported on two grounds—(*a*) the customary sequence of fundamental economic movements; and (*b*) the duration of former periods of price advance. A period of declining commodity prices is anticipated by several months of falling security prices, which in turn are preceded by stiffening money rates. At the present time money rates continue to decline, so that the first stage of the sequence of movements leading to lower commodity prices has not arrived. Fundamental economic conditions still favor continued price advance.

"There were four major upswings in prices from 1900 to 1913. These movements are shown in the accompanying chart where the ten-commodity index is plotted for this period. The first rise began in January, 1901, and lasted for 21 months; the second commenced in September, 1904, and continued for 30 months; the third started in September, 1908, and was terminated 14 months later; and the fourth continued for 14 months beginning in November, 1911. Thus the minimum duration of price advance was 14 months. The index number of the Bureau of Labor Statistics shows even longer periods of advance. Beginning in June, 1901, the upward movement continued for 20 months; the next advance started in October, 1904, and lasted for 36 months; the third upward movement commenced in August, 1908, and continued for 19 months; the last advance during the period considered began in May, 1911, and lasted for 29 months. When we consider that the present rise of prices has been under way for only 10 months, the evidence from former business cycles points definitely to a continuance of the present upward movement."

To be balanced against these favorable indications is one major unfavorable factor: the expected coal shortage. Another discouraging element, perhaps of less direct importance to us, is the continued failure of Europe to straighten itself out financially. Set the good against the bad, and be your own industrial prophet!



WAR DEPARTMENT

AUGUST

Aug. 8—Q.M. SUPPLIES. Camp Dix, N. J. Auction. For catalog write Q.M.S.O., 1st Ave. and 59th St., Brooklyn, N. Y.

Aug. 9—Q.M. SUPPLIES. Brooklyn, N. Y. Auction. For catalog write Q.M.S.O., 1st Ave. and 59th St., Brooklyn, N. Y.

Aug. 11—Q.M. SUPPLIES. Camp Meade, Md. Auction. For catalog write Q.M.S.O., 1st Ave. and 59th St., Brooklyn, N. Y.

Aug. 15—Q.M. SUPPLIES. Norfolk, Va. Auction. For catalog write Q.M.S.O., 1st Ave. and 59th St., Brooklyn, N. Y.

Aug. 18—Q.M. SUPPLIES. Charleston, S. C. Auction. For catalog write Q.M.S.O., Candler Warehouse, Atlanta, Ga.

Aug. 22—Q.M. SUPPLIES. New Orleans, La. Auction. For catalog write Q.M.S.O., Candler Warehouse, Atlanta, Ga.

Aug. 24—AIR SERVICE SUPPLIES. Park Field, Tenn. Auction. For catalog write Commanding Officer, Park Field, Millington, Tenn.

Aug. 29—AIR SERVICE SUPPLIES. Americus, Ga. Auction. For catalog write C. O., Air Intermed. Depot, Americus, Ga.

Aug. 31—Q.M. SUPPLIES. Camp Funston, Kan. Auction. For catalog write Q.M.S.O., 1819 W. Pershing Rd., Chicago, Ill.

SEND FOR CATALOG

SELLING PROGRAM

SEPTEMBER

Sept. 6—ORDNANCE SUPPLIES. Rochester, N. Y. Auction. For catalog write Chairman, Phila. Dist. Ord. Salvage Board, Philadelphia, Pa.

Sept. 12—Q.M. SUPPLIES. Camp McClellan, Ala. Auction. For catalog write Q.M.S.O. Candler Warehouse, Atlanta, Ga.

Sept. 15—Q.M. SUPPLIES. Camp Meade, Md. Auction. For catalog write Q.M.S.O., 1st Ave. and 59th St., Brooklyn, N. Y.

Sept. 19—Q.M. SUPPLIES. Camp Lewis, Wash. Auction. For catalog write Q.M.S.O., Ft. Mason, San Francisco, Calif.

Sept. 19—ORDNANCE SUPPLIES. Erie, Pa. Auction. For catalog write Chairman, Phila. Dist. Ord. Salvage Board, Philadelphia, Pa.

Sept. 21—Q.M. SUPPLIES. Omaha, Neb. Auction. For catalog write Q.M.S.O., 1819 W. Pershing Road, Chicago, Ill.

Sept. 22—AIR SERVICE SUPPLIES. Houston, Tex. Auction. For catalog write C.O., Aviation Genl. Supply Depot, Houston, Texas.

Sept. 26—Q.M. SUPPLIES. New Orleans, La. Auction. For catalog write Q.M.S.O. Candler Warehouse, Atlanta, Ga.

Sept. 26—Q.M. SUPPLIES. Camp Devens, Mass. Auction. For catalog write C.O., Boston Genl. Intermed. Depot, Boston, Mass.

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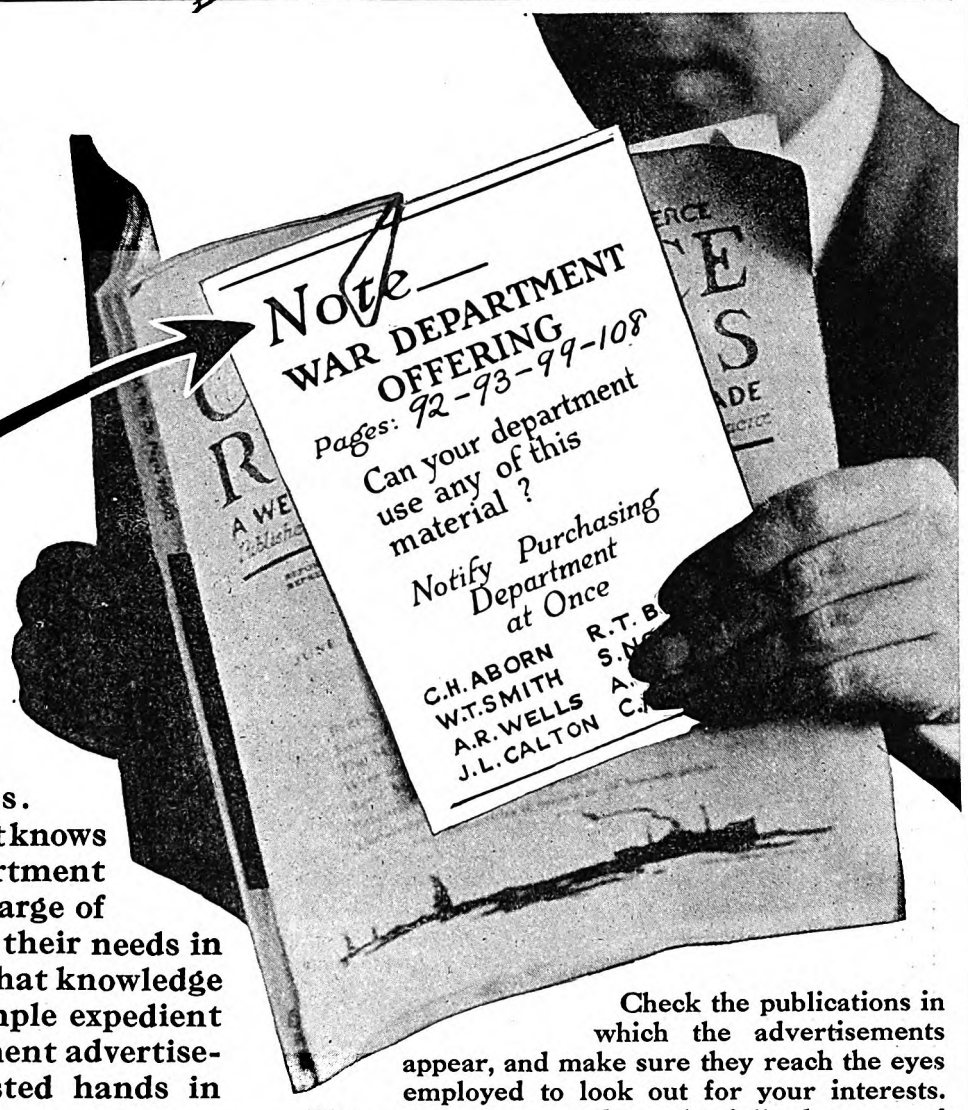
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Chief, Sales Promotion Section
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ARTMENT

The INDUSTRIAL CALENDAR

Secretaries of Associations are invited to send us the dates of their conventions as early as possible so that their conventions may be properly listed below. When especially requested by Association Secretaries, we will send dates and other available notices concerning meetings of other associations.

Aug. 7-11. *Universal Craftsmen Council of Engineers,* Cleveland, O. (Thomas H. Jones, Sec., 33 Linden Ave., Cherrydale, Va.)
Aug. 7-25. *National Merchandise Fair,* Grand Central Palace, New York. (Lew Hahn, Director, 200 Fifth Ave.)
Aug. 8-9. *National Association of Window Glass Mfrs.,* Cedar Point, Ohio.
Aug. 8-11. *American Institute Elec. Engineers, Pacific Coast Section,* Vancouver, B. C.
Aug. 10. *Southern Pine Association,* Memphis, Tenn.
Aug. 12-14. *International Mounmental Granite Producers' Assn.,* St. Cloud, Minn.
Aug. 13-19. *American Ceramic Society,* summer excursion, New York State and Canada.
Aug. 14. *American Pharmaceutical Association,* Cleveland, O. (Edward Spease, Secretary, 2045 Adelbert Rd., Cleveland, O.)
Aug. 15-17. *Memorial Craftsmen of America,* Springfield, Mass. (T. E. Cassidy, Secretary.)
Aug. 22-25. *International Assn. of Municipal Electricians,* New Bedford, Mass.
Aug. 23-25. *American Association of Railroad Superintendents,* Kansas City, Mo. (J. Rothschild, 400 Union Station, St. Louis, Mo.)
Aug. 24-25. *Canadian Gas Association,* Hamilton, Ont. (G. W. Allen, Secretary, 19 Toronto, St., Toronto, Ont.)
Aug. 25-Sept. 1. *National Automobile Show,* Toronto, Ont.
Aug. 28-Sept. 2. *Graphic Arts Exposition,* Mechanics Building, Boston.
Aug. 28-Sept. 2. *National Safety Council,* Detroit, Mich. (S. J. Williams, Sec., 168 N. Michigan Ave., Chicago, Ill.)
Sept. *American Society Agric. Engineers Reclamation,* Second National Convention, Kansas City, Mo.
Sept. *Amalgamated Assn. Street & Railway Employees of America,* National Convention, Oakland, Cal. (R. L. Reeves, Secretary, 260 E. High St., Detroit, Mich.)
Sept. 1-7. *Natural Gas and Petroleum Association of Canada,* Niagara Falls, N. Y. (S. A. Morse, Secretary, 48½ Market Square, Chatham, Ont.)
Sept. 4-9. *American Chemical Society,* Carnegie Music Hall, Pittsburgh, Pa. (Charles L. Parsons, Secretary, Box 1505, Washington, D. C.)
Sept. 4-9. *Gas and Fuel Section of the American Chemical Society,* Pittsburgh, Pa. (Dr. R. S. McBride, Secretary, Colorado Bldg., Washington, D. C.)
Sept. 5-7. *Engineering Institute of Canada,* Winnipeg, Man.
Sept. 7-9. *New York State Coal Merchants' Association,* Richfield Springs, N. Y. (G. W. F. Woodside, Secretary, Arkay Bldg., Albany, N. Y.)
Sept. 11-15. *Association of Iron and Steel Electrical Engineers,* Cleveland. (J. F. Kelly, Secretary, Empire Bldg., Pittsburgh.)
Sept. 11-16. *Bakery Equipment and Material Exposition,* Municipal Pier, Chicago, Ill. (B. M. Warner, Secretary, Conway Bldg., Chicago, Ill.)
Sept. 11-16. *National Exposition of Chemical Industries,* Grand Central Palace, New York. (F. W. Payne, Sec., Grand Central Palace.)
Sept. 11-16. *International Assn. Printing House Craftsmen,* Boston.
Sept. 12-14. *Retail Bakers of America, Chicago.* (J. M. Hartley, Secretary, 10 S. La Salle St., Chicago.)
Sept. 12-15. *American Bakers Assn., Chicago.* (H. E. Barnard, Secretary, 1135 Fulliton Ave., Chicago, Ill.)
Sept. 12-15. *Atlantic Deeper Waterways Assn.,* Portland, Me.
Sept. 13-15. *Motor and Accessory Manufacturers' Assn.,* Lafayette Hotel, Buffalo, N. Y.
Sept. 14-16. *American Assn. of Port Authorities,* Toronto, Ont.
Sept. 19-22. *Pacific Coast Gas Assn.,* Santa Barbara, Cal. (W. M. Henderson, Secretary, 445 Sutter St., San Francisco, Cal.)
Sept. 21-23. *American Electrochemists Society,* Hotel Windsor, Montreal, Canada.
Sept. 23-27. *National Assn. of Cost Accountants,* Atlantic City, N. J.
Sept. 23-30. *New York Closed Car Show,* Grand Central Palace, New York.
Sept. 25. *American Institute of Mining and Metallurgical Engineers,* San Francisco, Cal.
Sept. 25-28. *Illuminating Engineering Society,* Boston, Mass. (Clarence Law, Seccretary, Irving Pl. and 15th St., New York City.)
Sept. 25-29. *National Association Retail Druggists,* Detroit, Mich. (S. C. Henry, Secretary, 168 N. Michigan Blvd., Chicago, Ill.)
Sept. 25-30. *National Association Advertising Specialty Mfrs.,* Chicago, Ill. (B. Blackwood, Secretary, 208 S. LaSalle St., Chicago, Ill.)
Sept. 26-30. *National Assn. Ry. & Utilities Commissioners,* National Convention, Detroit, Mich. (James B. Walker, Secretary, Pelham Manor, N. Y.

Foreign Events

September. *Sociedad Rural Argentina,* Buenos Aires, Argentina.
Sept.-Nov. *Engineers Congress,* Rio de Janeiro, Brazil.
Sept. 7-Nov. 12. *International Exposition (centennial),* Rio de Janeiro, Brazil.
Sept. 15. *International Fair,* Bandoeng (Java).
Sept. 15-20. *Automobile Show,* The Hague, Holland.
Sept. 18-23. *Second Annual Meeting of the International Chamber of Commerce,* Rome, Italy.
Sept. 21. *Textile Fair,* Hamburg, Germany.
Sept. 22-25. *Fifth International Fur Fair,* Lucerne, Switzerland.
Sept. 25-Oct. 3. *Automobile Show* at the Kaiserdamm Hall, Berlin, Germany.
Oct. 1-15. *General International,* Lyons.
Oct. 4-15. *Automobile Show,* Grand Palais, Paris, France.
Oct. 12-23. *International Commercial Vehicle Exhibition* at Olympia, London, England.



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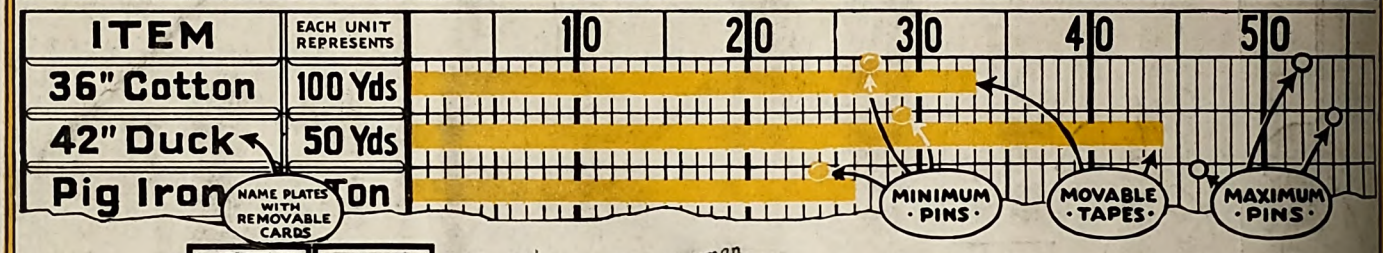
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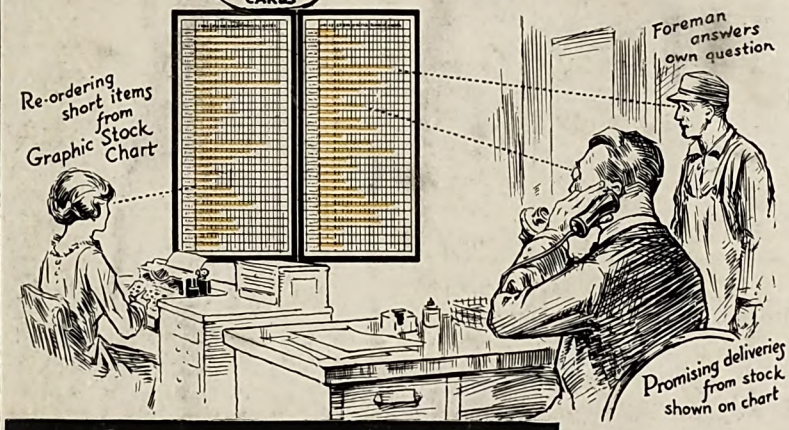
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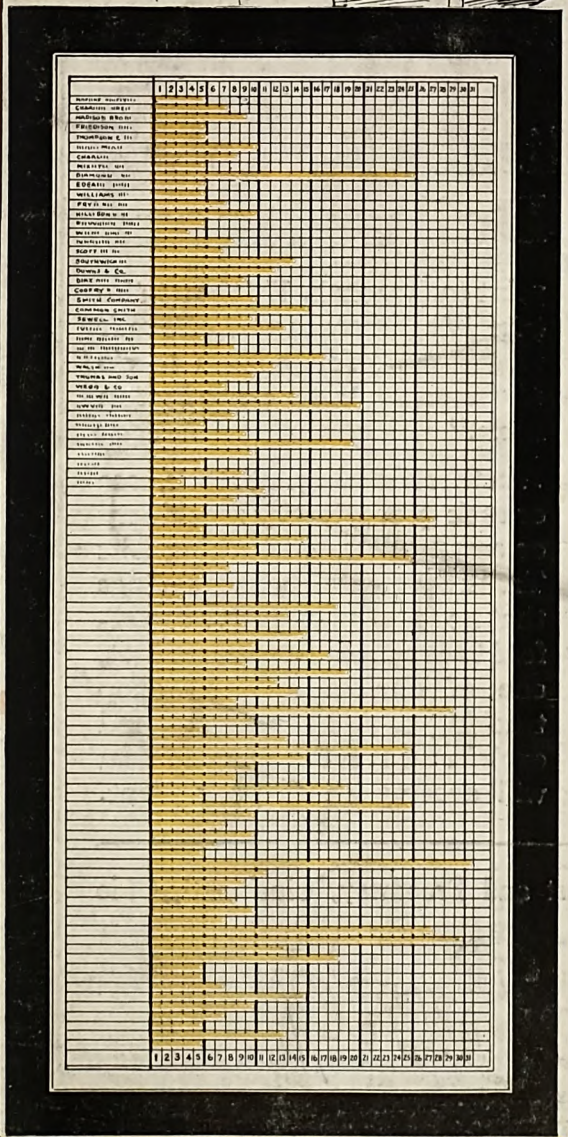


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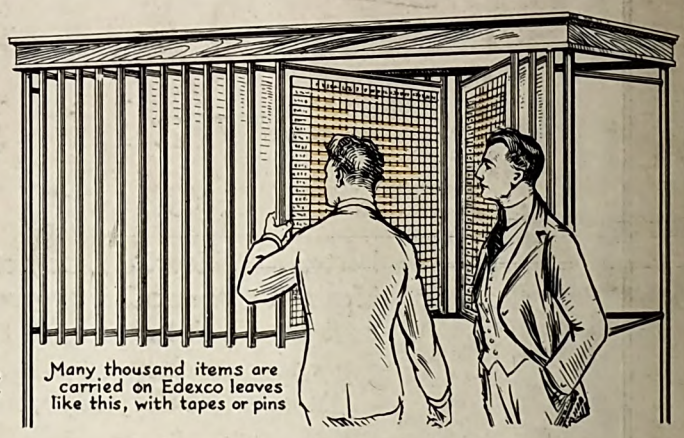
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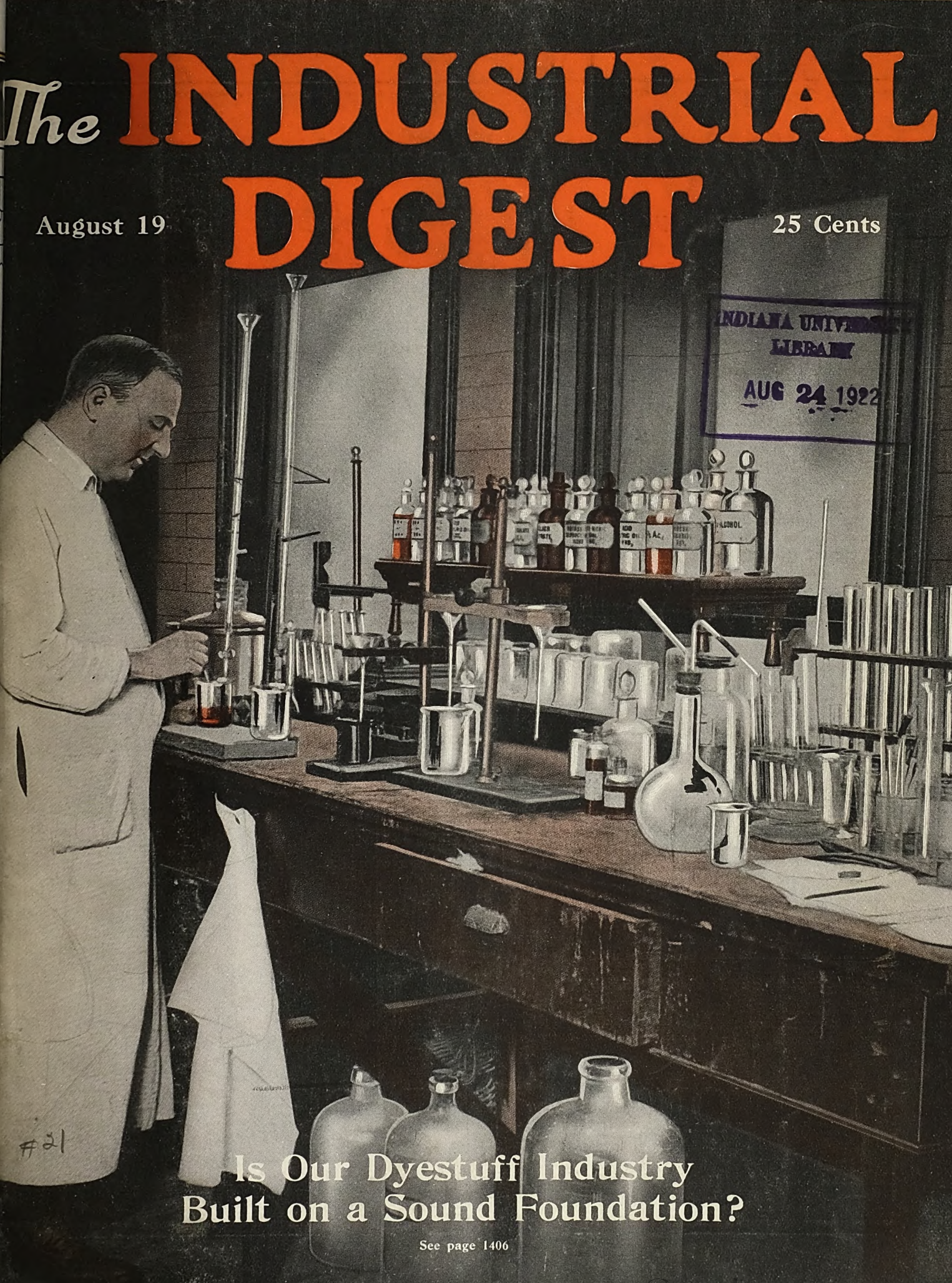
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Is Our Dyestuff Industry Built on a Sound Foundation?

See page 1406

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A problem for the President, General Manager, Director, Secretary or Treasurer.

Each business today is headed for a new port:—

> "The commonly accepted but traditional and antiquated methods of cost accounting, prevalent in so many plants, are falling down under the pressure of modern manufacturing methods. These accounting methods, disguising as they do the real costs, and presenting instead fictitious costs whose real values are thoroughly concealed, have no place in the modern American intensive production manufacturing plant. *What our managers need is not a cost system whose primary purpose is to lend itself, through the accounting department, to a financial audit, but a cost system which is primarily designed to reveal true costs in time to control them and to prevent them from becoming excessive.*"
>
> THE EDITORS,
> Industrial Management.

Methods of production planning, of accounting, and most emphatically of cost determination, perhaps efficient in other days, have now become an inadequate *collection of habits—rut-running habits.*

Can your decisions and policies in meeting present conditions, then, be other than fettered by such habits—these "ghosts of yesterday"?

The solution lies not in revolution, but in evolution; through a fresh point of view and the application of sound economic principles.

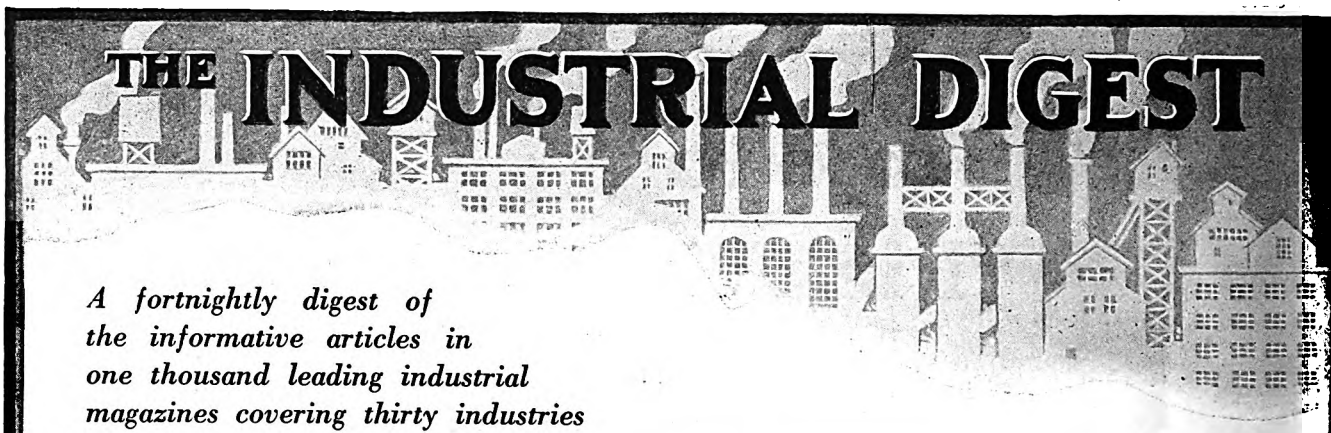
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Industrial, Organization, Cost and Sales Engineers



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Hyatt roller bearing equipped Mercury trailers transferring freight at the Roanoke, Va. terminal of the Norfolk and Western Railroad.

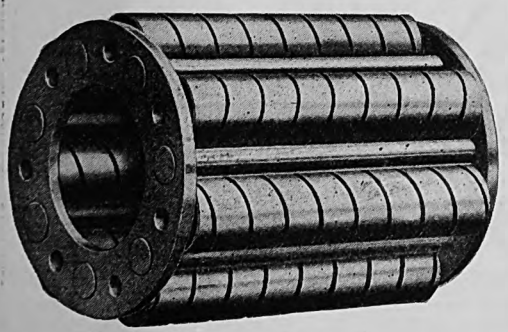
All N & W Freight at Roanoke Handled on Hyatt Bearing Trailers

Fourteen months ago the Roanoke, Va. terminal of the Norfolk and Western Railroad discarded their hand trucking methods and installed trailers and tractors throughout.

There are 250 trailers, all Hyatt roller bearing equipped, some built by the Lakewood Engineering Company and some by the Mercury Manufacturing Company.

This terminal is a transfer point where full car freight is broken up for distribution into package cars, and about one million pounds of freight are handled every eight hour day. The Hyatt equipped trailers are contributing largely to the rapid handling of this freight at the lowest cost per ton.

Whatever your trucking requirements, you'll find that Hyatt equipped trucks will cut your traction cost, your lubrication cost and give years of service without adjustment or replacement—specify Hyatt equipped—it pays.



Hyatt Roller Bearing Company

Industrial Bearings Division

New York, N. Y.

Tractor Bearings Div.—Chicago
Motor Bearings Div.—Detroit

Pacific Coast Div.
San Francisco

USE HYATT BEARINGS ON YOUR LINE SHAFTS TOO
BULLETIN 127

When do you need a doctor?

Most of us go to a doctor when we feel sick. But the Chinese have a better idea .... they employ a doctor to keep them well. They pay him as long as they feel fit, and when they are ill the physician's income stops.

Most manufacturers go to the industrial engineer only when their business is not running properly. A few (most of them leaders in their lines) have a better plan .... they consult a specialist in industrial efficiency *before* the business falls sick. And so they seldom run up against the troubles experienced by the ninety and nine who ask for assistance and advice too late.

We specialize in keeping plants well—from the view-point of profits. Possibly we can help you—we have helped others.

Appraisals (Industrial, Insurance and Financial)
Auditing *Cost and General Accounting* *Design and Construction of Buildings* *Employment and Social Service*
Engineering (Industrial, Consulting, Power Plant)
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Cooley & Marvin Co.

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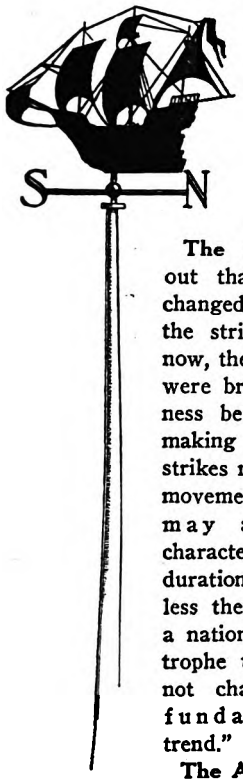


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THE INDUSTRIAL DIGEST

Aug. 19
1922



The Business Weathervane

A Summary of Expert Opinion

The Brookmire Economic Service points out that present strike conditions have not changed the fundamental situation: "Whether the strikes end tomorrow or a month from now, the character of the basic conditions which were bringing about the period of active business before the handicap of the strikes was making itself evident, remains unchanged. The strikes may delay its start, may hamper its free movement, and may alter its character and duration, but unless they end in a national catastrophe they will not change the fundamental trend."

The Annalist does not entirely agree with this view. "The difficulties encountered with labor have had a tendency to slow down the pace at which business was moving prior to this development and, in many lines, the situation is so bound up with the ability to get ample fuel supplies and railroad transportation that the future necessarily will be clouded and uncertain until definite settlement of the present difficulties has been reached."



(Chicago Tribune)

Apparently he doesn't know it's loaded.

The favorable and unfavorable factors in the present situation are analyzed as follows by J. H. Tregoe, Secretary of the National Association of Credit Men. The favorable items follow:

1. The improvement in collections, which has come as a result of increased volume of trade, both wholesale and retail.

2. The increased production of basic commodities.

3. A large volume of trade, as reflected by car loadings and by indices of wholesale and retail distribution.

4. Great activity in the construction line, that shows thus far little tendency to fall off. The figures for June were somewhat lower than those for May but the figures for contemplated work are still high and should normally forecast continued activity in the construction industry for the rest of the year.

5. Increased employment in a large number of manufacturing lines, and a seasonal increase in the farming communities.

These items are considered unfavorable:

1. Overshadowing all other factors are the railroad and coal strikes. The disturbances in these two major industries, that are so vital to modern manufacturing and distribution, cannot but communicate themselves with increasing strength to American business.

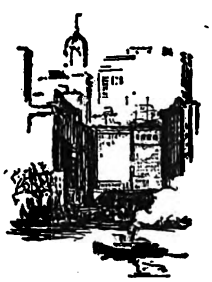
2. Shortages in skilled and unskilled labor in certain industries which will reflect themselves in increased costs of manufacturing and distribution.

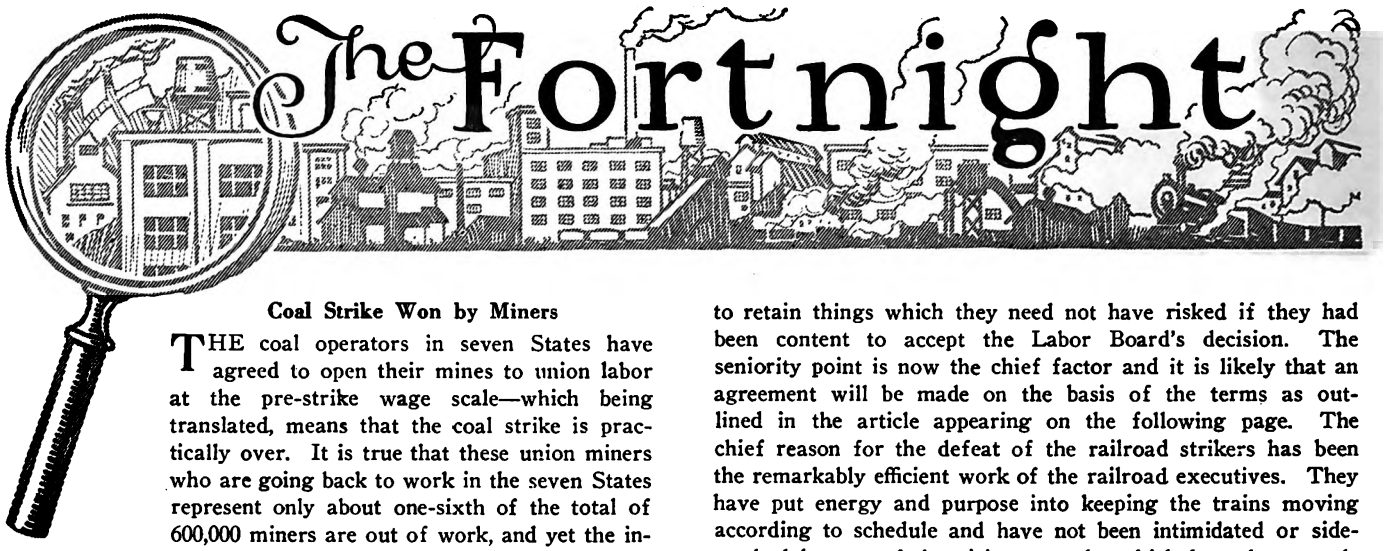
3. Failure of The Hague conference, with its resultant continued unsettlement of the Russian and western European situation.

4. The continued unsettlement of the indemnity and inter-allied indebtedness situation. The rapid depreciation of German exchange and the fluctuation of other western European exchanges is confusing to commerce and unsettling to the economic and political life of western Europe. American commerce is affected by the back-wash of these movements, and will continue to be affected until they are checked.

5. The uncertainty of tariff and bonus legislation, which is restraining and harassing business.

The **Harvard Economic Service** points out that fundamental conditions remain favorable to continued business advance. The present strikes are obstacles to immediate improvement, and their retarding effects are now increasingly evident; but in the past such factors have had only a temporary influence upon business, and no different result is to be expected at the present time. The prospect is for expanding business activity, despite such temporary retardation as may result from prolongation of labor difficulties.





Coal Strike Won by Miners

THE coal operators in seven States have agreed to open their mines to union labor at the pre-strike wage scale—which being translated, means that the coal strike is practically over. It is true that these union miners who are going back to work in the seven States represent only about one-sixth of the total of 600,000 miners are out of work, and yet the influence of this first settlement is so great that it is certain to break the force of the strike and bring the operators to terms shortly. It is estimated that 1,125,000 tons a week will be produced by the 100,000 men who are going back. 4,000,000 tons a week are being taken out of non-union mines and about 400,000 tons a week are being imported during the month of August from Britain. This total of 5,650,000 tons a week which is available for immediate consumption is 2,350,000 tons less than our weekly requirements as estimated by the Geological Survey.

With the priority routing and with a careful conservation of remaining supplies it now looks as if business would be able to go through the winter without many shutdowns.

The settlement means, of course that the strikers have won and the fact that they have won in the first battle makes it fairly certain that they will also win in the anthracite field. Details of the settlement in the anthracite districts are expected immediately. The chief feature of the settlement is the provision for the establishment of a fact-finding commission to prevent any recurrence of the strike next April when the present wage agreement stops. The strike is having its effect on the wage reductions in other industries. It will also prevent the cost of living from showing any further appreciable decline, in all probability. One other effect of the strike is the remarkable activity in the Welsh collieries which have been shipping at the rate of 1,500,000 tons a month since the first of July, according to reports.

End of Rail Strike Near

The rail strike has not been settled yet but according to present indications it is a matter of only a few days before this threat to prosperity has also vanished. The strikers have already lost in this case. They are now fighting simply to retain things which they need not have risked if they had been content to accept the Labor Board's decision. The seniority point is now the chief factor and it is likely that an agreement will be made on the basis of the terms as outlined in the article appearing on the following page. The chief reason for the defeat of the railroad strikers has been the remarkably efficient work of the railroad executives. They have put energy and purpose into keeping the trains moving according to schedule and have not been intimidated or sidetracked by any of the vicious attacks which have been made upon them. There has been more than the customary amount of sabotage and incidental damage to railroad equipment during this strike—but it has served only to arouse stronger public antagonism to the strikers' cause.

Shutdown of Steel Mills Averted

The steel industry continues to suffer on account of the dual strikes and during the last week more than ten blast furnaces have shut down making a total of approximately thirty-six. The end of the coal strike has come just in time to prevent a general shutdown among the steel mills.

The demand for steel continues strong. The last statement of the United States Steel Corporation showed an increase of some 140,000 tons more in unfilled orders on hand than at this time last year.



(Kansas City Star)

Maligned often but always the best bet in trouble.

Bumper Crops Predicted

The most favorable development during the past fortnight was the Government forecast of an unusually fine crop this fall. Figures for all crops are above the ten-year average. A very thorough analysis of the effect of this bumper crop upon business conditions will be found in this issue.

When it is understood that practically half of the farmer's income is realized during the last four months of the year, the importance of a favorable crop report just at this time becomes apparent. The price of foodstuffs will certainly be lower this fall and winter.

Senate Still Discussing Tariff

The tariff bill has been taking some hard knocks lately but it seems about ready for passage by the Senate. Just before debate closed in the Senate, some one hundred additional changes were presented and forced through by the Republican majority, over severe Democratic opposition. Econo-

in Perspective

mists generally agree that the proposed bill will have the effect of checking imports, and since we will not be able to take imports in payment Europe will not be able to buy our exports in usual quantities and prices will suffer in consequence. The wool schedule as well as the sugar and hide and leather schedules have been the cause of very strenuous critcism and still further changes in the bill are likely before final passage. If the bill is approved by the Senate it must be gone over in conference between the House and Senate and passed again in its final form by both houses. If there are enough Republican congressmen who believe that the results of enactment of the bill will be politically disastrous to them an effort will no doubt be made to kill the bill in conference or in any event to hold it over until after election. Unless this occurs the bill will probably become a law about October first.

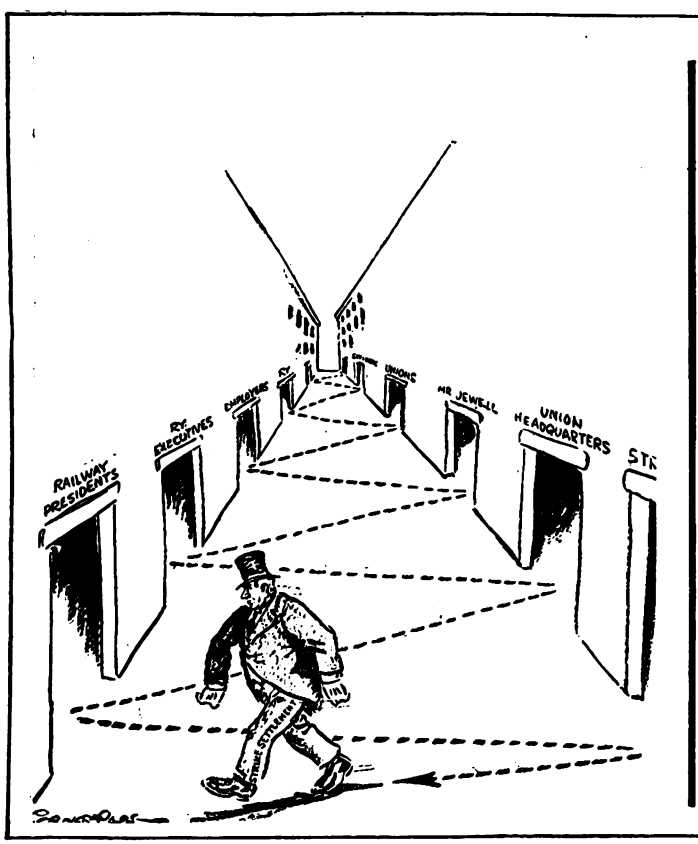
Five Reasons for Better Business

Generally speaking, there are five fundamental reasons for better business this fall—reasons which become doubly interesting now that the prospect for the conclusion of the two great strikes is bright. The first reason is that liquidation in merchandise and in wages has been completed. The second is the remarkable crop outlook for this fall.

Practically one-half the people in the United States are going to have an increased buying power. The third is the fact that loans all over the country have been greatly reduced. Money is easier and financial conditions are excellent for an increase in business. Interest rates are still declining. The fourth reason for anticipating better business this fall is the remarkable decrease in failures and the excellent credit situation. Fifth, the rise in prices of stocks and bonds is helping every business concern and every bank. This makes financing new enterprises much easier and promises large expansion. There seems to be no question but that this fall will see a steady swing toward prosperity.

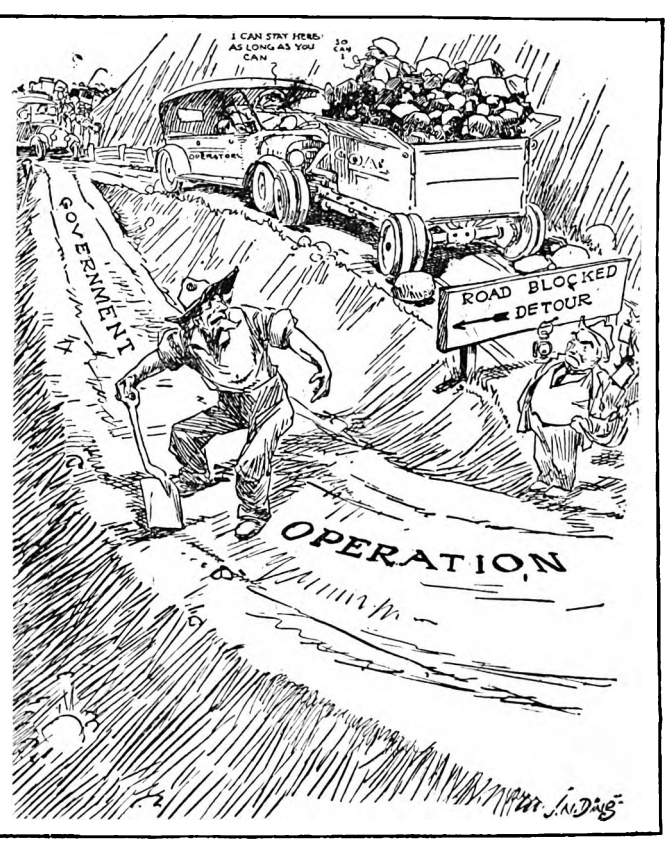
Prediction of 30,000,000 Automobiles Is Answer to Claim of Over-expansion

Henry Ford says that there will be 30,000,000 automobiles in the United States some day and since there are only 10,000,000 in the country today, this means that the market is only one-third saturated. If our population increases to more than 150,000,000 there will be more than 30,000,000 automobiles. He expects eventually a ratio of one automobile to every four or five inhabitants. He also believes that the aircraft industry is in its swaddling clothes. The solution of the whole problem of heavier-than-air machines is a lighter engine with greater horsepower, according to Mr. Ford. These statements coming from a man who may be considered the leading expert on automotive problems will go a long way toward dispelling the gloom of over-expansion which some bankers still seem to see hanging over the automobile industry.



(Louisville Courier-Journal)

But he's on his way.



(St. Louis Globe-Democrat)

A detour that may become the main road.

Strangled to Death by Strikes

Is this to be the epitaph of business this fall and winter or will the strike grip loosen?

THE soft-coal strike has been virtually broken. With the acceptance of the miners' demands in seven of the leading bituminous States the resumption of mining operations in all parts of the country is a matter of only a few days.

The agreement signed at Cleveland on October 15, providing for an immediate resumption of soft-coal mining in seven States, calls for wage rates and working conditions which were in effect prior to the strike. This includes the "checkoff" system of collecting union dues. It also provides for the calling of a joint conference on October 2 to formulate a method of negotiation for a new wage agreement to become effective on November 1, 1923, when the present contract expires. It calls for the appointment of a "fact finding" commission to investigate the industry and develop the facts for the benefit of all concerned. The members of this committee will be approved by President Harding, who is to appoint members if the miners and operators fail to agree on them.

Machinery to Prevent Future Strikes

The most important point in the agreement is the establishment of machinery to prevent future strikes. This machinery is to be created by a joint conference to be called in Cleveland on January 3, 1923, for the purposes of presenting a new wage agreement not later than January 8. The settlement is subject to ratification by a vote of the five thousand local unions of the United Mine Workers of America. It will require about ten days for this verification, but the actual mining of coal will be resumed immediately. It is expected that 100,000 of the more than 600,000 strikers will be at work by the time this issue is off the press. It is proposed to open the strip mines immediately, but it will be several days before the balance of the bituminous mines are pronounced safe for operation. Representatives of the mine operators in West Virginia, Pennsylvania, Ohio, Indiana, Michigan, Oklahoma and Washington, with an annual total output of 60,000,000 tons, have accepted the union terms.

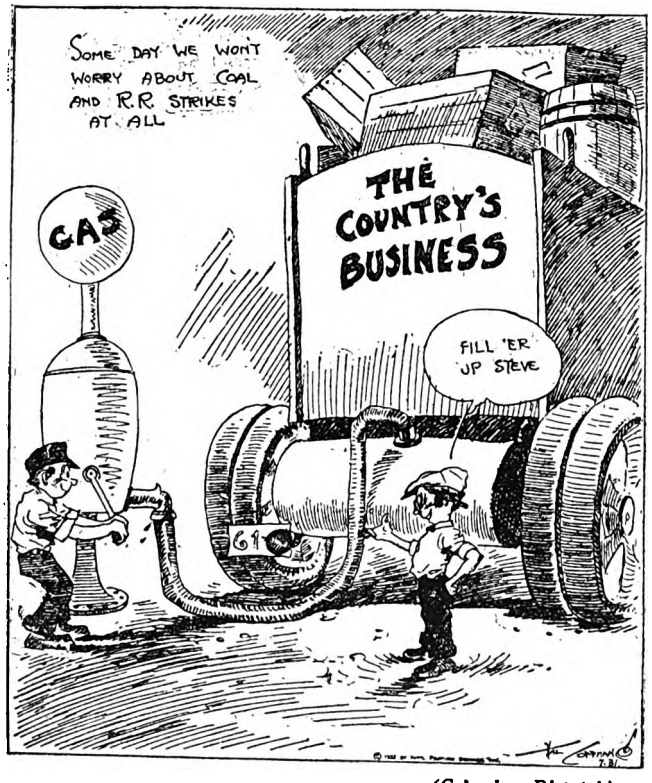
This, of course, is only a small proportion of the total union coal tonnage of the country, but the Cleveland agreement will certainly be the basis of future settlements for the balance of the operators. Illinois and Ohio interests, representing some 15,000,000 tons a year, left the conference, assigning as their reason "the apparent unwillingness of the mine workers to agree to a reasonable method of negotiating future wage scales and working conditions, which would guarantee to the public a continuous flow of coal and prevent a recurrence of the present suspension next April, as provided for in the plan submitted and voted down by them."

This question of arbitration seems to many the most important point at issue, inasmuch as it provides for preventing future strikes in the soft-coal field.

Sufficient Coal for Essential Industries

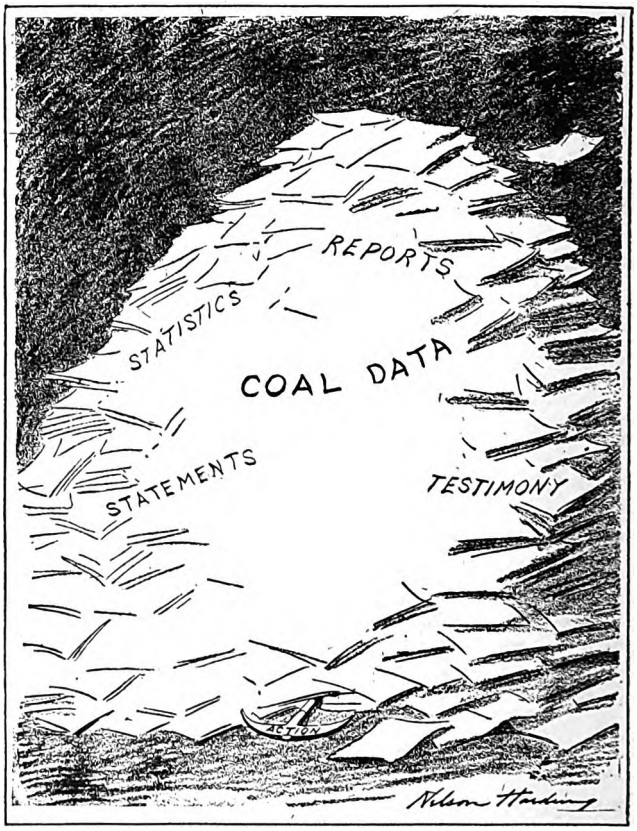
Reliable reports indicate that other bituminous operators are already preparing to compromise and that the last of the miners will be at work before the first of September.

In any event, the addition of the output of 100,000 union miners to that of the non-union mines will greatly relieve the



(Columbus Dispatch)

A rainbow. We all know many more such jokes. About the only compensation for strike embarrassments is the humor afforded by these beautiful dreams.



(Brooklyn Daily Eagle)

Find the needle in the haystack.



(New York Call)

The best of intentions won't run a poor engine.



(New York World)

Still blocked.

Looking at It from Opposite Sides of the Fence

shortage. It will not, of course, meet all requirements, but it will make it possible for all essential industries to carry through the winter without difficulty. The Philadelphia conference between anthracite operators and anthracite miners was postponed until the completion of the Cleveland agreement at the request of President Lewis of the United Mine Workers. The test at Cleveland on the issue of the arbitration agreement and the miners' victory in having it rejected in favor of a jointly constituted advisory commission will probably give the miners enough influence to secure a settlement plan in the anthracite regions similar to that which will go into effect in the bituminous districts. There seems to be no doubt that within a few days anthracite miners will be at work on the wage scale which existed prior to April 1. Although the anthracite operators have steadily refused to restore the old scale permanently, it will probably go into effect until the first of the year, or at least until a commission can successfully arbitrate a new rate, which would be some time this fall.

Rail Situation Deadlocked

WITH the coal strike resolving itself satisfactorily after 22 weeks of idleness in all union mines, public attention is centered on the rail situation, which grows worse every day. For some time the leaders of the "Big Four" Brotherhoods have been attempting to aid in the settlement of the strike by bringing together the railway executives and strike leaders. The first conference ended unsatisfactorily, but another one will probably be held by August 21.

The strike leaders are prepared to offer a definite adjustment of the seniority issue along the following lines: First, men on strike shall be reinstated and shall take the position with regard to seniority rights immediately after employees who remained loyal to the railroads. Second, new men employed to take the place of strikers shall take position as to seniority immediately after the reinstated strikers. The importance of this proposal is that it permits the railroads to take back strikers without breaking their promises to new men who were employed as strike-breakers. There is an undercurrent of opinion among some of the executives which favors the acceptance of a proposal of this sort. The strikers have apparently awakened to the fact that their rejection of the concessions granted by the executives at the first meeting in New York put them in a very unpopular light.

On the 17th of August President Harding appeared before the Senate and the House assembled in joint session to deliver a message on the rail strike crisis. It is understood that tremendous pressure has been exerted upon the Administration to allow executives more time in which to settle the strike "out of court." The President apparently feels that any such delay is too dangerous, and, although he has expressed no intention of asking for legislation permitting federal operation, this course remains open to him in case the strike continues to be a deadlock.

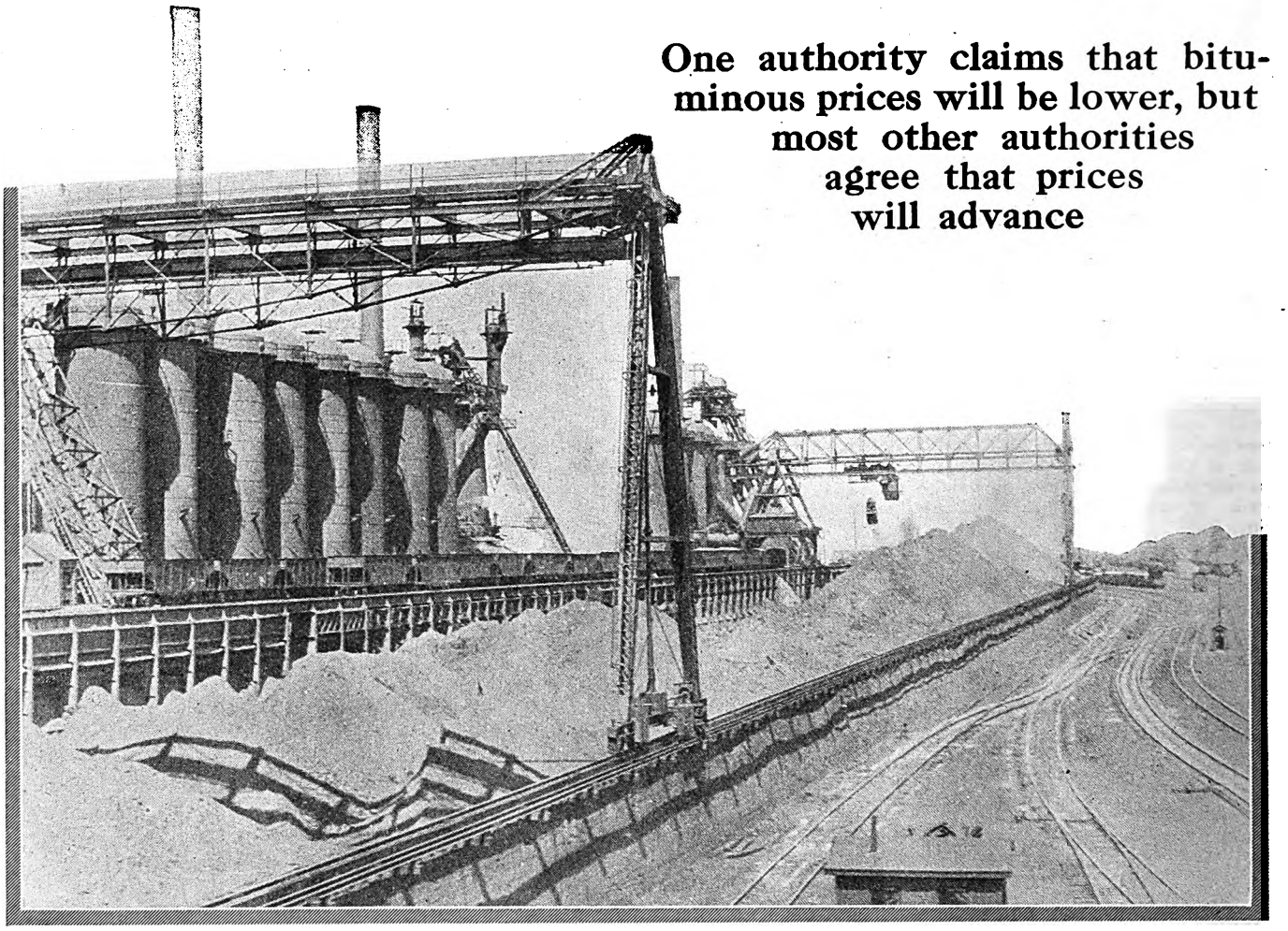
It is not believed that the victory of the coal miners will have any effect on the rail tie-up, since it is pointed out that any wage paid the miners can be passed on to the consumers, whereas the reduced rates announced by the Interstate Commerce Commission make it imperative that railroad wages be reduced or else the roads will face bankruptcy.

In the meantime, reports of operations from practically every road in the country are to the effect that conditions are steadily improving. On many lines the traffic is normal, and on other lines it is nearly so. The one serious factor is the question of rolling stock. A large number of locomotives are going out of commission every week because of the inability to keep them in good condition. The "Big Four" Brotherhoods have laid great stress upon this point, even to the extent of issuing orders that their members might refuse to take out trains unless they are satisfied that the equipment is in good condition.

The breakdown of rolling stock at a time when there is going to be a tremendous overload on the roads on account of an unusually heavy crop movement and delayed coal shipments is bound to result in increasing the coal shortage and producing a traffic tie-up which bears all the earmarks of being a near-calamity.

What Will Coal Cost This Fall?

One authority claims that bituminous prices will be lower, but most other authorities agree that prices will advance



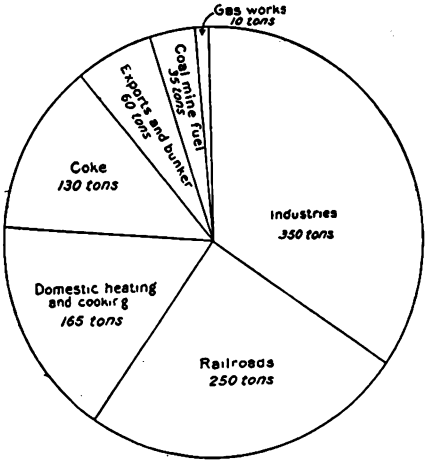
WHAT will coal cost next fall? As the mine and rail strikes drag on, this question grows more and more interesting—and increasingly difficult to answer. Even after the strikes end, this will be a matter of acute interest.

Until industrial executives can get an idea of how much their coal is going to cost, it will be difficult for them to frame prices and plan production for the coming season. The uncertainty of the coal situation has an unsettling influence upon all industry, and makes it difficult to look ahead.

If you ask anyone connected with the coal industry how prices will be in the fall you will doubtless be told the expect a heavy increase. Coal dealers, coal trade associations and coal trade papers will not venture to make exact or detailed prophecies, but they manage to convey the impression that their commodity will be very expensive. The only thing that would keep prices down, they intimate, would be successful enforcement by the Government of a price limit; and they are inclined to be skeptical about the possibility of such enforcement.

The prices which Secretary Hoover requested all coal operators to keep as evidence of their public spirit are now being subjected to a severe strain. These prices are: lump, $3.75; mine run, $3.50; nut, pea and slack, $3.25, all f.o.b. mines. The general situation in regard to the Hoover prices is summarized in the following market dispatch from Columbus, Ohio, published in *National Coal Mining News.*

"Coal prices are beginning to sky-rocket, and while many operators are refusing to join in boosting prices because of the shortage, others are taking part in the runaway market and are asking as much as $6 a ton for mine run. The majority of operators are standing firmly by the prices set by Secretary Hoover, and they say that until he lifts the ban they will continue at those prices. In many cases, however, *operators quoting the Hoover prices have little coal to offer.*"



What becomes of your coal?—*(American Elevator & Grain Trade.)*

The Government has arranged for priority in the shipment of coal, and it is proposed that in the expected railroad congestion cars be alloted only to those operators who keep the Hoover prices. Whether this scheme will work remains to be seen. Up to the present it may be said that Hoover has not succeeded in keeping prices down. On the price lists now being published by the trade papers, the Hoover prices are quoted as lows, and the highs run anywhere from 75% to 150% higher. The market is starting to run wild, as a result of the shortage and the increasing transportation difficulties.

Little relief may be expected from the importation of British coal. It is reported in New York that arrangements have been made for the importation of 1,000,000

tons during the next few months. Since the American mines, in spite of the strike, are now producing nearly four times this amount every week, it can easily be seen that this British coal can have only a slight effect upon the situation.

In other words, according to most sources of information identified or closely connected with the coal industry, the price of coal will undoubtedly soar. Industries which can get coal at any price will probably consider themselves lucky.

Why Coal Should Be Cheaper

IN the face of this, it is unusually interesting to find someone who prophesies a decrease in coal prices as a result of the strike. Such a prophet is H. A. Haring, who says in *The Annalist.*

"One who buys bituminous coal for industrial use may *expect the strike to bring him immediate reduction by the amount of his emergency excess freight rates; to be followed by gradual reductions in the basic mine price until December or thereabout,* when prices should rule at about the levels of December, 1921; *thereafter to ensue further price recessions to the equivalent of the wage reductions awarded the miners, translated to the basis of a ton of coal.* Prices thenceforth will rule at low levels until another upheaval curtails output below current demand. Such an upheaval will be either a widespread strike of mine or railroad workers or a serious car shortage. Such has always been the swing of bituminous coal prices."

Mr. Haring's argument is so unusual and its implication so interesting to industrial executives that it is worth quoting at length. His statements, he says, do not apply to anthracite coal nor to bituminous used in homes. He is concerned only with bituminous coal used in industry, which is 93% to 95% of the total soft coal output of the country.

The coal mines, he says, will make good profits for the balance of 1922, but at the same time—

"The purchaser of bituminous coal (for industrial purposes, not domestic, be it remembered) will be able to lay down his coal at the power plant siding for less total cost than has prevailed since April 1 when the strike broke. This cost, furthermore, will be less by sums ranging from $2 to $4 a ton.

"What is even more significant, it is altogether likely that, by the time the December or January calendar page is turned up, similar coal will be yet lower in price. From about that date, in all probability, the price will range something like 50 cents below the levels for the Winter of 1921-22, before a strike was threatened.

"Incredible as these two statements may seem, the welcome forecast of lower prices for bituminous coal is supported both by past experience and by present conditions."

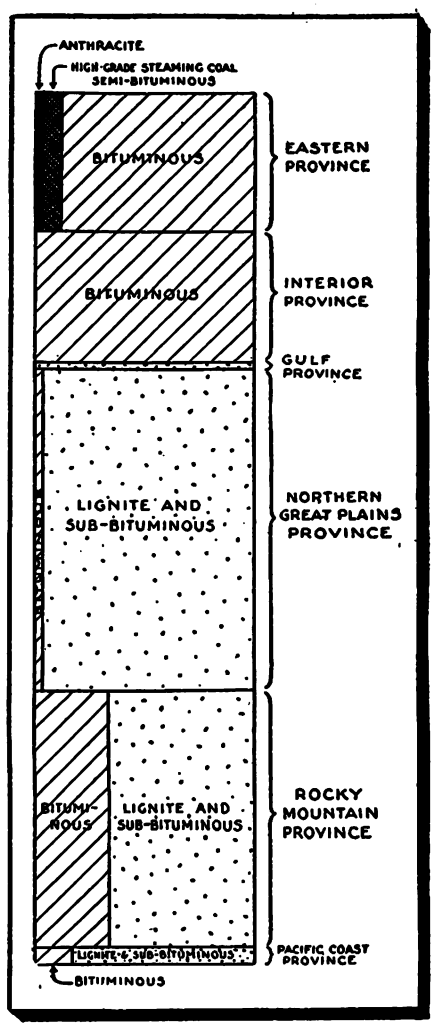
The cost of coal to the industrial consumer, Mr. Haring points out, consists of two factors, the price of coal at the mouth of the mine and railroad freight. Regarding prices at the mine he says:

"Since April 1, when the strike came, coal has not been available from the unionized territory. The non-unionized mines have, however, been able to produce coal sufficient for all immediate demands. So little short of total demand has been the supply that primary prices, at the mine mouth, have not risen unduly. Neither famine conditions nor famine prices have obtained. The Secretary of Commerce concluded a series of "gentlemen's" agreements with some operators, stipulating a maximum price of $3.50, which level has only on rare occasions been exceeded by mine owners. The statement holds true equally of the mines bound by the Hoover agreements and those not parties to any such binding promises. The ruling fact of the coal market has been not so much the honor of the mines not to gouge the buyer as the economic condition, which has been this: That supply has about equaled demand during the strike. Prices for coal, at the mine, have held at approximately $1 over the levels before the strike."

It will be observed that Mr. Haring's facts differ materially from those presented by the authorities identified with the coal trade. He proceeds to predict what will happen after the strike is settled, apparently assuming that the settlement will come soon:

"The first effect of the strike settlement will be a severe restriction of output in the non-unionized fields of the South, with consequent abrupt closing down of hundreds of smaller mines of the mushroom variety. The industrial centres, from the Missouri to the Atlantic, will at once begin to receive coal from the reopened unionized districts. The important thing to know is: What will be the cost of this coal?

"For a time, possibly as much as two months, until mining operations return to normal and output is restored to something approaching average tonnages, the mines may get fancy prices for coal. Certainly the owners must be credited with the desire to recoup their losses by getting all they can. During the autumn months the seasonal demand for coal is always the heaviest of the year, and in this particular year the demands of the Northwest for up-the-lakes coal will be insistent. Lake navigation continues until the first week of December. Inasmuch as little coal has been free for lake shipment during the early summer, the necessities of the Northwest will stimulate price levels until December. Elsewhere, too, stock piles are undeniably low. This condition will tend to uphold prices for a time."



The coal reserves of the United States according to grades and geographical distribution.—*(Century Co.)*

"The normal rate of coal production will be attained six weeks or two months after operations resume. Normally, and always except when interrupted by artificial influences the bituminous coal production of the country exceeds the consumption by 30% to 50%. This condition is normal, and should ever be borne in mind by the coal purchaser. Some weeks of operation will be required for the overproduction to overtake the deficiencies of the four months of the strike, but by the time the ice in Lake Superior closes navigation in December every prospect indicates that the mines will be loading more coal than current demand will absorb. December generally witnesses the peak of coal demand, and, consequently, of prices.

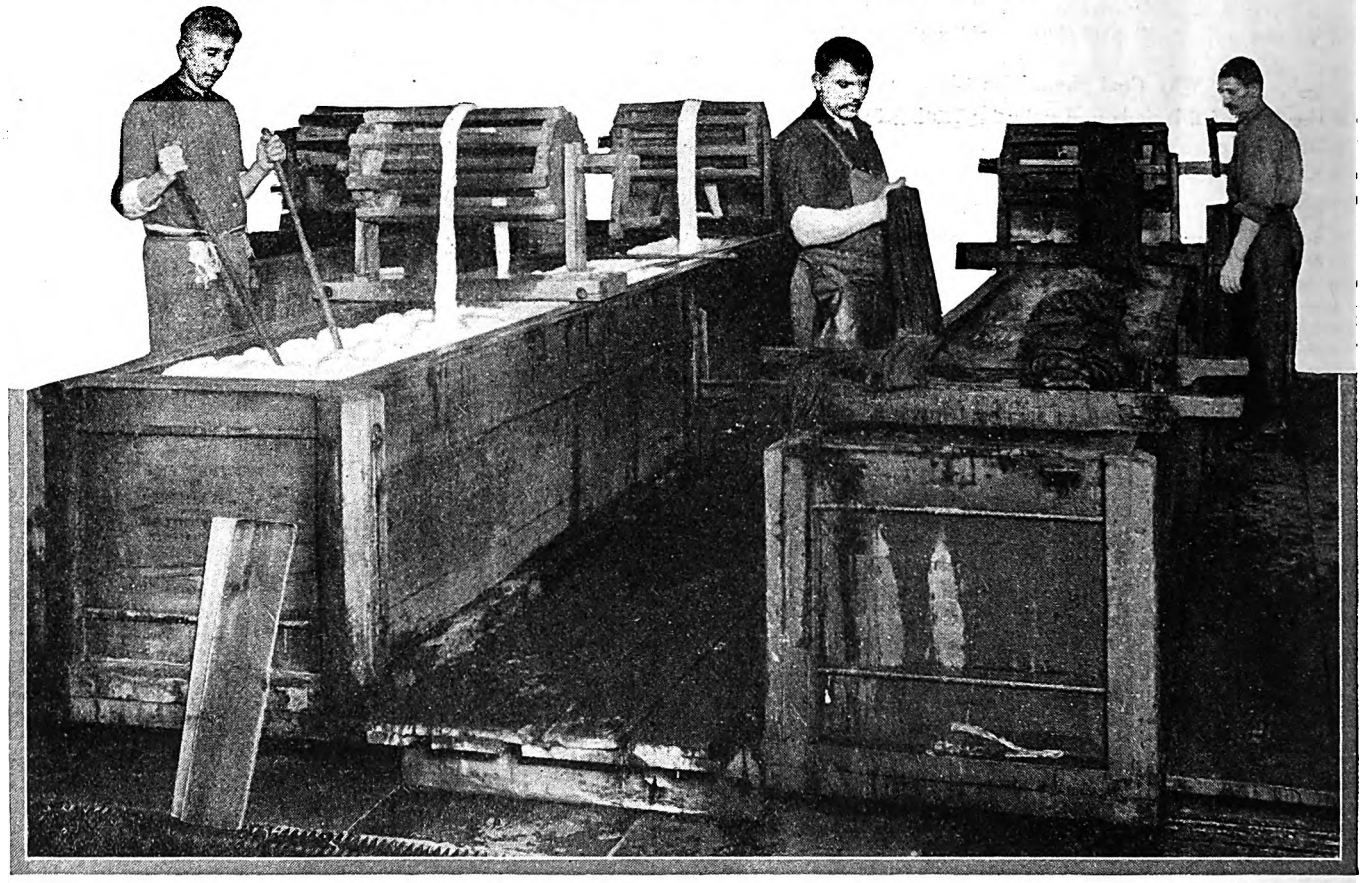
"Prices, at the mine mouth, that is the basic or primary prices, will accordingly drop quickly from the $3.50 of the existing "gentlemen's" agreement. Levels will fall gradually, but inevitably, to about the ruling prices of last March. These prices were $2 to $2.50. Shortly thereafter, somewhere late in December or in January, depending largely on railroad conditions, the buyer of industrial coal will perceive further softening of prices, as quoted on the mine basis.

"These further reductions may be confidently anticipated, slipping downward lower and lower until a level is attained below where coal has been available since June and July, 1919. This prediction is predicated on the assumption that a wage reduction is inevitable as a part of the strike settlement. Our unionized coal mines remain as the only American industry throughout which no reductions have come from the peak of wage inflation. The miners' pay levels must recede.

"Important for the buyer of coal is it to remember that just so soon as mine production begins to overtake current

(Turn to page 1457)

Is Our Dyestuffs Industry Built on a Sound Foundation?



(Brown Bros.)

This is the way dyes are used in a textile factory to color all sorts of fabrics.

THE recent controversy concerning the German dye patents now held by the Chemical Foundation, and the importance of these patents to the infant dye-stuffs industry, has led to a great many conflicting statements in the press. THE INDUSTRIAL DIGEST presents in this issue an authoritative statement of both sides of the question: What protection does our dyestuffs industry need?

THE American dyestuffs industry is in trouble. The Senate has refused to continue the embargo on the importation of chemicals which can be made in this country, and without an embargo the dye manufacturers say their industry must perish.

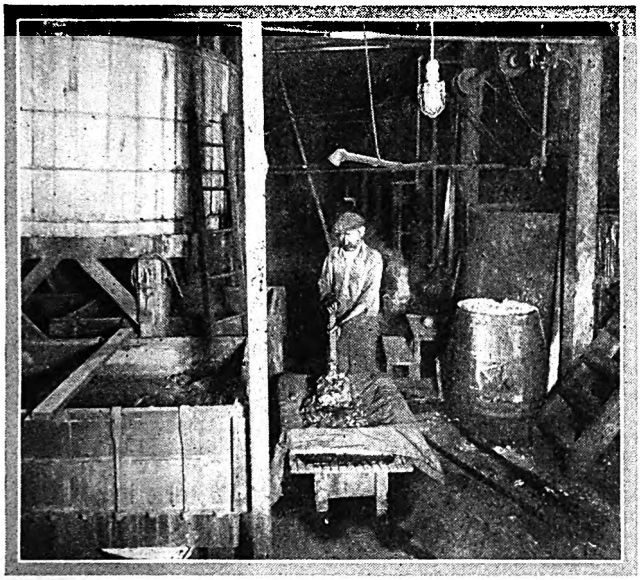
To add to their troubles, the Government has started action against the Chemical Foundation to recover the German patents confiscated during the war. The Chemical Foundation leases these patent rights to any American manufacturer who wants them; and on this basis the American dyestuffs industry has been operating. Now the Government wants the patents back, and no one knows what will happen to them. The American manufacturers say our dyestuffs industry will undoubtedly disappear if they are returned to the Germans.

Against these two attacks the industry is fighting. It has not yet given up hope of persuading the Senate to change its mind about the embargo before the tariff bill is passed. It is giving active support to the Chemical Foundation and its president, Frances P. Garvan, in the struggle to prevent the return of the German patents. While the outcome remains in doubt, the industry is paralyzed by uncertainty. It cannot go ahead with its work, because it does not know what will happen to it.

The synthetic organic chemical industry, of which the dyestuffs industry is a part, is of national importance. Its dyes are absolutely essential to the textile industry, and the medicines it produces are equally important from a pharmaceutical point of view. In time of war it is of paramount importance, for modern explosives are synthetic organic chemicals, produced by the same processes that are employed in making dyes. Moreover, the industry makes possible the more efficient use of our fuel resources, since it uses the by-products of coke manufacture. Its development is therefore a matter of importance to all other industries, each of which is necessarily interested in the conservation of fuel.

"This is a particularly interesting industry to me because it is an industry that thrives by the use and application of the wastes of the other industries," said Herbert Hoover, Secretary of Commerce, in an address before a group of synthetic organic chemical manufacturers. "This is turning to account what would otherwise be almost wholly waste products, mostly those that escape into the atmosphere or into the streams of this country. By these processes we add to the total sum of the commodities that we have to divide among our people.

"I do not think that it would be at all an over-estimate to say that the wastes from wood, coal and other products upon which this industry is based have an annual value of



(Brown Bros.)

The coal tar product is here being taken out of the cooking vat preparatory to going into the press.

upwards of a billion dollars if they could be turned to account. I suppose that the total output of the industries in the organic chemical group is perhaps two or three hundred million dollars per annum."

As a matter of fact, the total value in 1921 was less than $60,000,000. Consequently there is even more truth than Mr. Hoover thought in the secretary's next statement:

"There is still an enormous field of waste to be overcome, of added value to be taken into the resources of our country. Today every coke oven that is not recovering its by-products is turning a loss into the air that can never be recovered. Your industries are the industries that take these wastes and turn them to account—add them into the total sum of our assets. The industry's real purpose is not the manufacture of explosives and poisonous gases, but the use of waste products for the good of the whole of the people. Nevertheless this is one industry that we must provide on our own soil, and that is of vital necessity for national defense."

Before the World War, America had practically no dye and synthetic organic chemical industry at all. Germany had a monopoly of these products. She supplied the world with 90% of its coal-tar chemicals, and Switzerland produced the other 10%. Relations between the German industry and the Swiss were known to be cordial.

When the war broke out there were five or six small companies in the United States producing finished dyes. They did not really amount to a synthetic organic chemical industry, because they brought all their intermediates (coal tar chemicals in the earlier stages of manufacture) from Germany. Every once in a while during a period of thirty years before the war an American company would begin the production of one or more products in competition with the German industry; but in spite of attempts to protect these ventures by custom duties, the Germans always triumphed.

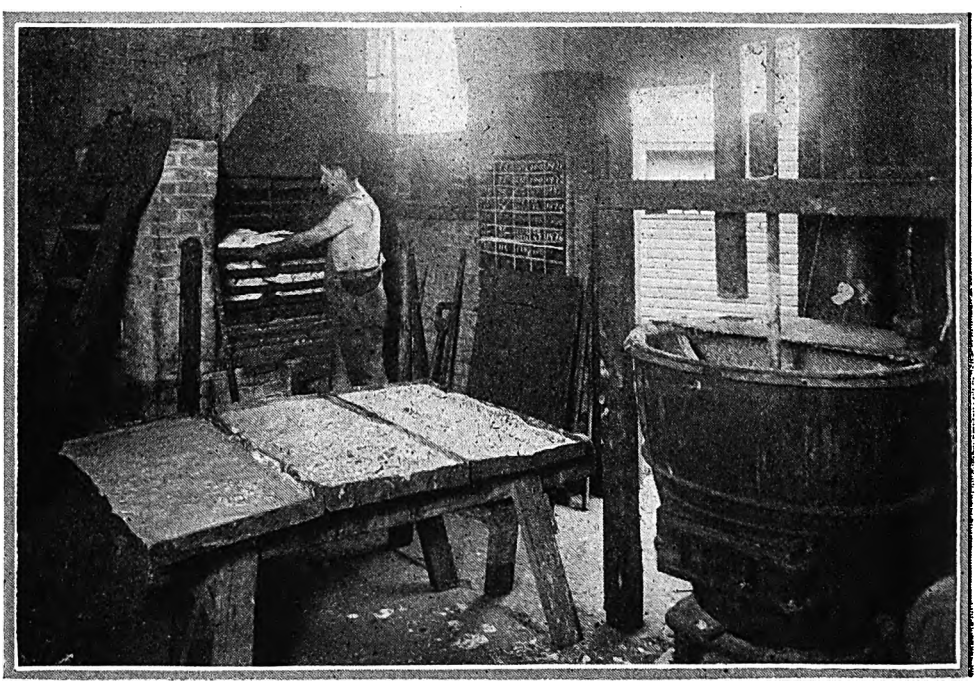
The Allied blockade of Germany made it essential for the United States to make her own coal-tar chemicals. Under the protection of the Allied fleet the American industry got its start. At first the American manufacturers made bad dyes, and were unable to make the more difficult chemicals at all; but after a period of years they learned to turn out acceptable products.

The industry reached its height in 1918, when 357,662,251 pounds of intermediates were produced. These chemicals were used chiefly for explosives, poison gases and dyes for military purposes. In the following year the output dropped, for the war demand ceased. In 1920, however, production went up again under the influence of the world-wide post-war inflation. In that year 257,726,911 pounds of intermediates were produced, valued at $95,291,686. These were manufactured into dye, photographic chemicals, pharmaceuticals, flavors, perfumes and synthetic tanning materials, both for export and domestic production. The industry was protected (as it still is today) by a licensing system which forbade the importation of any chemical which could be manufactured in this country. More than 200 manufacturers were operating. The American chemists had by this time made considerable progress in the more difficult dyes. Germany, however, still held, for technical reasons, a monopoly of the most highly complicated chemicals.

When the depression came, the dye industry went to pieces. The total production of intermediates in 1921 by 107 different manufacturers was 70,899,912 pounds, a decrease of 73% in quantity from the 1920 output. The total sales during 1921 amounted to $8,483,463. The decrease, according to the U. S. Tariff Commission, was due to the loss of most of our export trade in dyes, the large stocks carried over from the previous year, and the general business depression.

The domestic production of dyes in 1921 by 74 manufacturers totaled 30,008,690 pounds, a decrease of 56% from that of 1920. The sales during 1921 totaled 47,513,762 pounds, with a value of $39,283,956. The sales exceeded the production by 22%, indicating that a part of the domestic consumption was supplied from stock carried over from the previous year's abnormal production.

In 1921 and 1922 the technical devolpment of the American industry continued. A large number of dyes of great com-



(Brown Bros.)

The greatest possibility in the world is that which faces a coal tar intermediate. There are a thousand and one resultants into which an intermediate may be resolved. On its way to a finished dye the product goes through a baking process, as seen above. At the right is a cooking vat.

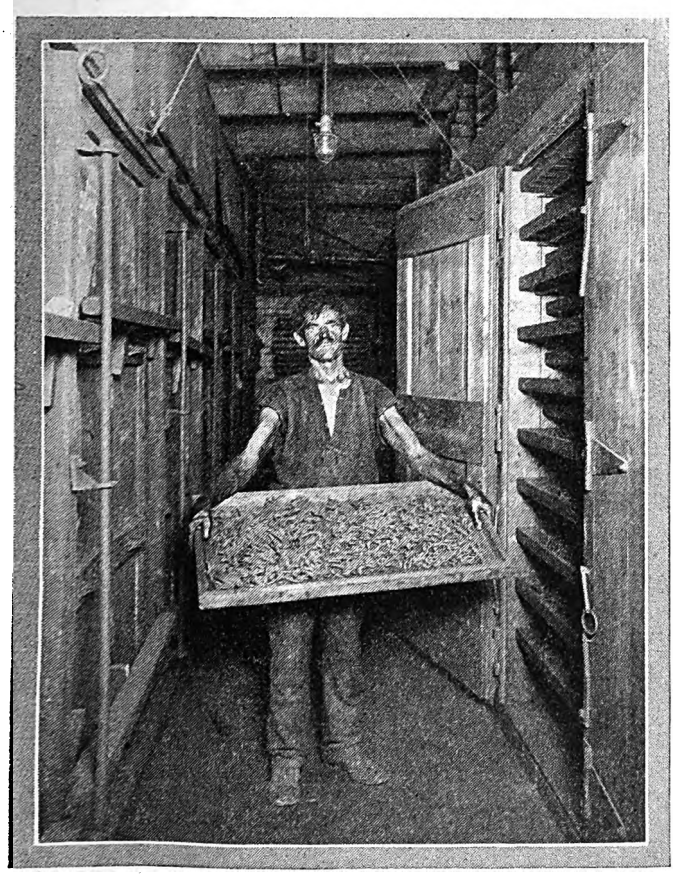
and fostered by the German Government itself, in competition with our own individual manufacturer. If you put a tariff of 100% upon dyestuffs it would cost Germany $30,000,000 to destroy our American industry, putting it in its broadest sense. That is, it would be necessary to send a whole year's supply of dyestuffs over.

Therefore, no tariff would be high enough, because no price is too high for Germany to pay. Her organic chemical industry is the cornerstone of her economic structure, and is the cornerstone of her entire foreign trade. It is the wedge which she relies upon to force all her other products into the trades of all countries. Therefore, it is not a question of merchandising, but it is the value to the Germans of control of the organic chemical industry of the world.

The textile manufacturers, who are the chief consumers of dyes, are divided on the embargo question. Some feel that the Government should not force them to accept what they believe to be inferior dyes at high rates, merely for the benefit of a few American dyestuffs manufacturers. They don't care who makes their dyes, as long as they are good dyes and cheap. Others are willing to pay the price of an embargo now in order that the domestic dyestuffs industry may be developed. They say that they do not want to become dependent again upon the Germans for an essential raw material. *Textile World*, one of the important organs of the textile manufacturers says:

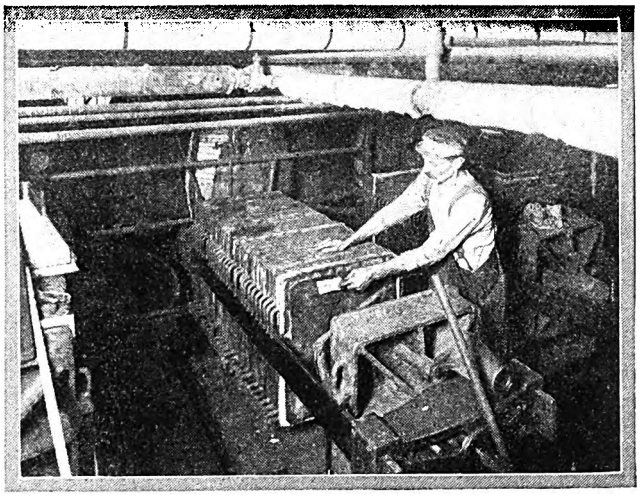
"We have conscientiously advocated a selective embargo on dyes for a limited number of years because we believe that the best national interests demanded such a provision. We have fought hard for the passage of this measure even at the risk of offending certain of our readers."

The Senators who successfully voted to eliminate the dye embargo provision from the permanent tariff bill now under consideration declared that the tariff rates on dyes, contained in other parts of the bill, would afford the industry sufficient protection. These rates are 60% ad valorem plus 7 cents a pound on finished dyes, and 50% plus 7 cents on intermediates; and the President is authorized by the bill to increase the duties by 50% if he deems it necessary. Senator Moses, opposing the embargo, said that this is protection enough for anyone, and added:



(Brown Bros.)

This is dried red dye fresh from the drying kilns ready to be powdered and packed for commercial use.



(Brown Bros.)

The dye has just been through the filter press and is being scraped out by the workman, after which it goes to the dry kilns.

"The figures of the Tariff Commission show that the dye industry in this country has far transcended the 60% of total consumption which the dye makers in 1916 set for themselves as the limit at which they would begin to reduce their demand for protection; yet in spite of this, sir, we find them here impudently demanding a total embargo against all competition from abroad at a time when the chief members of the group are in a position to strangle equally all competition at home.

"This latter fact is evident, from the undisputed assertion that two dye makers in America today produce substantially 70% of the total American dye output. These two producers are the National Aniline & Chemical Co., whose output, admitted by itself, is substantially 40% of the total American production; and the du Pont Co., whose output is more nebulously stated by its president to be about one-sixth of the total production. These per cents combined, account for nearly 60% of the total American production; and it is significant that neither producer saw fit to dispute the assertion of the junior Senator from Utah that the two companies combined handle 70% of the American dye output.

"I do not need to argue from this that monopoly exists in the dye business in America; the figures speak for themselves. And they are strengthened each day in Washington by the close correlation and cooperation of the energetic lobbies of these two concerns in a manner to indicate something at least as strong as a gentleman's agreement."

To this Senator Frelinghuysen replied that an embargo is the only possible means of protecting an essential industry against foreign domination. He said:

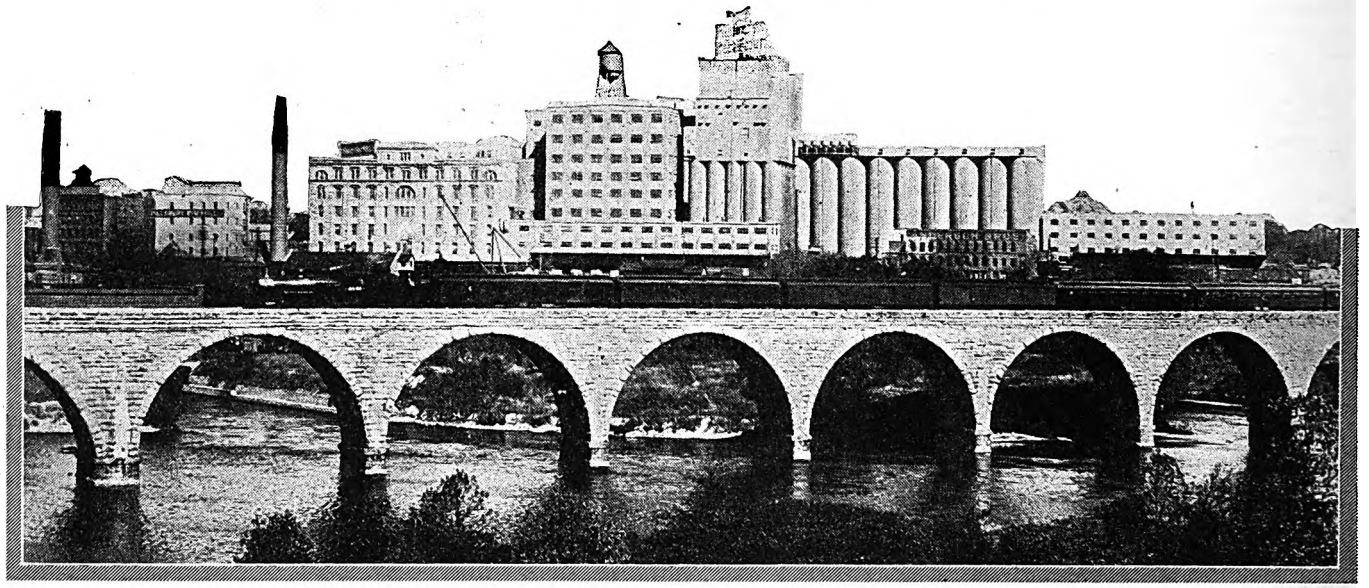
"We have the example of England, France, and Italy, who have embargoed importations of German dyes. In one instance we have a national subsidy, as in the case of Japan, in order to establish a dye industry.

"These governments have found it necessary from the standpoint of national defense, to embargo German dyes and to encourage the building up of the dye and coal-tar industry in their own countries. The question before the Senate is whether an independent American dye industry is to be maintained or whether, after eight years of respite from German domination, we are to destroy this American industry by our action here and turn it back to German control. I stand on the American side. There are advocates, able advocates, of Germany's interests.

"My fight for a dye embargo and my insistence upon its continuance is based upon two motives—first, to protect and continue the industry in my State (New Jersey); and, secondly, because I believe it is absolutely essential for the national defense, as I read the history of the war and what was accom-

(Turn to page 1456)

Why Good Crops This Fall May Slow Up Business



The largest flour mills in the world — Pillsbury's.

PLENTIFUL crops are to be expected this year, according to the August estimates of the Department of Agriculture. Growing conditions were so good during July that the Government predicts record crops of hay and sweet potatoes, corn crop of more than 3,000,000,000 bushels, more than twice as many apples as last year, the second largest crop of white potatoes on record and the fourth largest domestic tobacco crop the country has ever known. The wheat crop is expected to be slightly above the average for the past six years.

What will the plentiful crops mean to business? A bumper harvest is not an entirely favorable symptom. It may mean a reduction in the prices of farm products, and therefore a further curtailment of the farmer's buying power. If industrial production is not increased to a larger degree than farm production, the effect on conditions is likely to be unfavorable. The *Brookmire Economic Service* advances a plausible set of principles whereby the effect of crop conditions on business may be judged. It theorizes as follows:

"The prevailing low prices for farm products are a result of the uneven developments in industry and agriculture during the years which started with the outbreak of the late war, with a resulting relative over-supply of food products in comparison with the volume of finished products. In other words, that while industrial production had attained a very high volume during the war years, these products had not been used in the normal way to exchange for agricultural goods, but were devoted, to a great extent, to destructive purposes, and Government credits were used to absorb the products of the farm. . . . Supplies of food products available during war times were relatively greater, judged by price movements, than supplies of finished products. The result was a relatively small quantity of finished products, and a relatively large quantity of agricultural products, with, consequently, lower prices for the latter.

"It was pointed out that readjustment of this condition would necessitate either the curtailment of agricultural output to bring it to the level of industrial production, or an expansion of the latter to bring its volume up to the level of farm products. Since then, industrial production has been growing steadily greater, and it has been accompanied, as the theory held, by some corresponding strength in the markets for agricultural products.

"How will this relation be affected by the coming crops? Three different situations are possible. *If this year's crop should be smaller than those of the preceding year, while industrial output continued its growth, then with the relatively large amount of finished products to exchange for a smaller volume of farm output, farm prices should advance fairly rapidly. In the second situation, if this year's products should be about at the average of preceding years, with industrial output increasing, farm products would have the basis of a fairly strong market. If, as a third possibility, this year's products should be very much greater than those of preceding years, while industry was still growing, then the prices of agricultural products would be weak if the ratio of production increase was greater than that of industrial increase, and strong if that rate was smaller.*"

It appears, from the latest crop report, that our position this fall will be midway between the second and third possibilities. The crops will be considerably above the average of the past few years, but not sufficient to threaten a radical drop in agricultural prices.

The situation is made a little worse by the threatened curtailment of industrial production. This may further increase the spread between industrial prices and farm prices to the worse by the threatened curtailment of the industrial production. This may further increase the spread between industrial prices.

The Crop Forecasts

	August Forecast	July Forecast	1921 Final	1916-'20 Average
Winter wheat	*542	569	587	566
Spring wheat	263	248	208	233
All wheat	805	817	795	799
Corn	3,017	2,860	3,080	2,831
Oats	1,251	1,187	1,061	1,413
Barley	192	182	151	197
Rye	*79.6	82.0	57.9	67.8
Buckwheat	13.8	...	14.1	14.4
White potatoes	440	429	347	373
Sweet Potatoes	112.0	111.0	98.7	88.8
Tobacco (lbs.)	1,425	1,415	1,075	1,378
Flax	11.4	10.7	8.1	11.0
Rice	38.7	39.1	36.5	41.7
Hay, tame (tons)	93.1	90.4	81.6	85.1
Hay, wild (tons)	17.2	16.4	15.2	17.1
Sugar beets (tons)	5.08	5.13	7.78	6.62
Apples, total	202.0	190.0	98.1	179.0
Apples, com'l (bbls.)	33.4	31.4	21.2	26.8
Peaches, total	56.0	54.3	32.7	43.6
Peanuts (lbs.)	679	713	816	1,043
Kafirs	114	121	115	91.3

*Preliminary estimate.

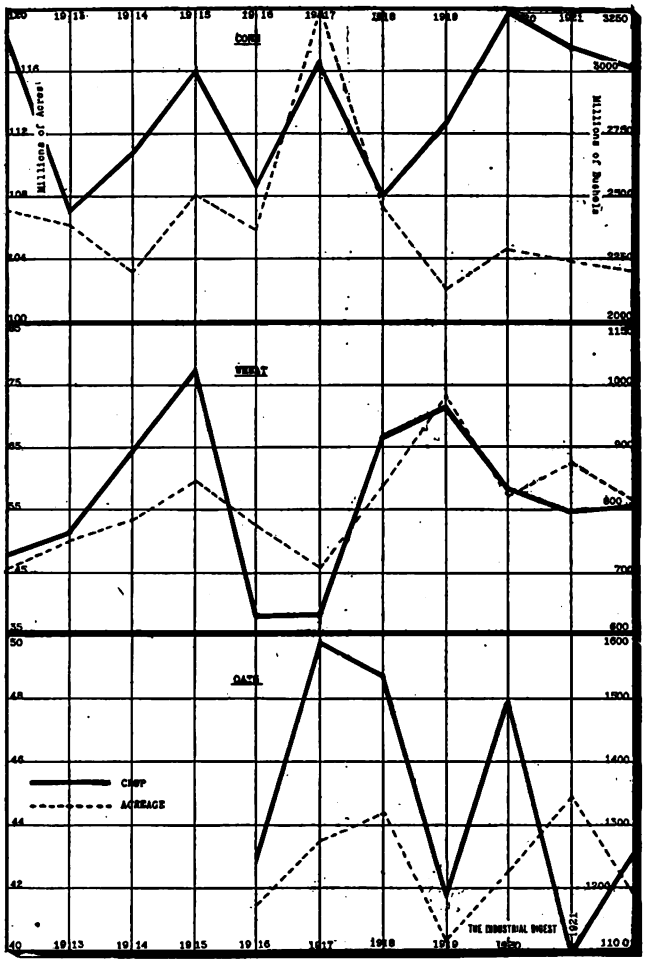
and farm prices to the farmer, resulting in a failure of the farmers' demand for industrial products to renew itself as it should if recovery is to be complete.

Farm prices have been dropping fast enough during the past year in comparison with industrial prices, and the situation is already bad enough for the farmer. Bradstreet's general average of commodity prices for August 1 was $12.0688, compared with $11.0576 on the same date last year—an increase of $1.0112. During the same period the prices of breadstuffs rose only $0.9081, livestock rose $0.0040, provisions dropped $0.0750, and fruits dropped $0.0302. The spread, therefore, is now widening.

Business conditions in this country will be better when farm prices are higher in relation to industrial products than they are today. Thus it appears that the trend as indicated by Bradstreet and forecast by crop reports is not entirely favorable.

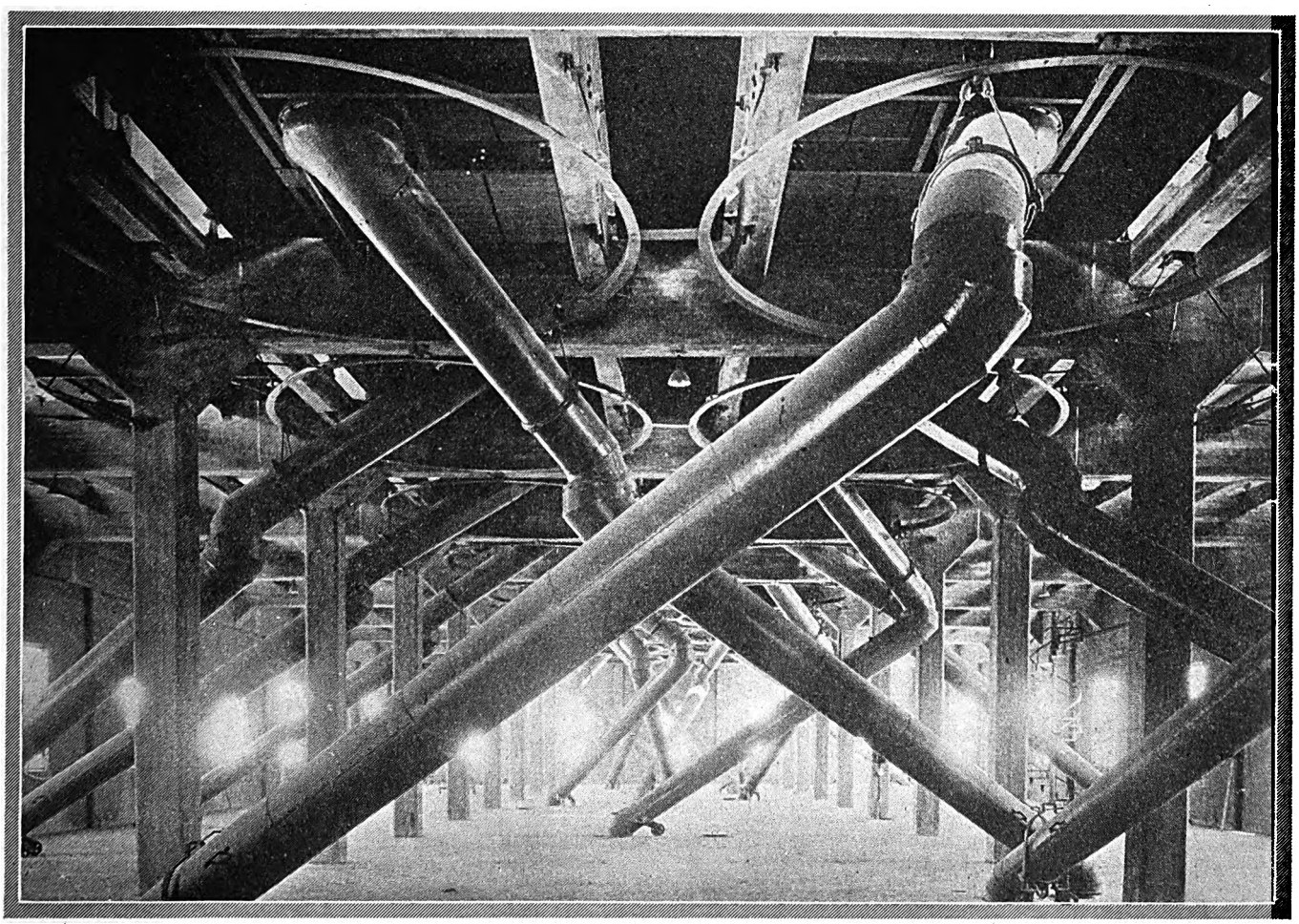
However, Roger W. Babson believes that good crops are of universal benefit. He says:

"If the crops continue as good as at present they will give a substantial boost to business this fall! It is still about six weeks to harvest, but so far most of the crops are doing well, and some are excellent. The most optimistic feature is that in nearly every section the prospective yield per acre is high. Unless some catastrophe occurs between now and harvest the outlook for the farming sections is brighter than for several years. This means that business as a whole will be helped, for nearly half of the people in the United States are farmers and many others are closely related. Financially the farmer has been a very sick man and his recovery will not be instantaneous. The amount



Fluctuations in corn and wheat crops and acreage since 1912, and oats crop and acreage since 1916. Figures for acreage are at the left in millions of acres, and figures for crops are at the right in millions of bushels. The charts are based on U. S. Government reports. The 1922 figures are the August estimates.

This nightmare effect is provided by one of the most remarkable sets of grain chutes ever invented. They are in use in New Orleans. These spouts are links between great distributing belts on the top floor of the elevator and the 308 bins. The spouts can be moved from one hole to another.





(Omaha Daily Bee)

A Promising Youngster

of farm mortgages paid off before maturity is also increasing. Whereas last year such prepayments were extremely rare, this year we see an increase, indicating a greater amount of ready money. Loans also are being gradually cut down. A large amount of frozen loans in the grain and cotton belts should be liquidated this fall, and the farmer again will be able to buy."

Some Hope for Wheat

UNQUESTIONABLY some encouragement is to be found in the wheat crop report. The August forecast for the total crop of winter and spring wheat combined is 805,000,000 bushels, compared with a forecast of 817,000,000 in July, a crop of 795,000,000 bushels last year and an average of 799,000,000 bushels for the five years from 1916-1920. Thus the wheat crop is above the average, but not startlingly large.

The world wheat crop this year, according to the best preliminary statistics, is smaller than the expected demand. Mark W. Pickell, agricultural statistician, summarizes the situation in the *American Co-operative Manager* as follows:

"Importing countries need approximately 200,000,000 bushels more than they had last year, while exporting countries have only about 75,000,000 extra to ship them. That, in a nutshell, is the world wheat situation today.

"On the basis of estimates of production, made either by Government or from acreage and crop reports, the production in Belgium, Bulgaria, Spain, France, Hungary, Italy, Poland, Rumania, and Czecho-Slovakia this year is 816,159,000 bushels compared to 908,443,000 bushels last year. On this basis, excluding Russia, Europe will produce this year 1,467,514,000 bushels compared to 1,633,448,000 bushels last year, or 165,934,000 bushels decrease.

"The crops in the United States, Canada, and British India, however, show an increase, the production being estimated at 1,520,235,000 bushels compared to 1,346,329,000 bushels last year, or 173,906,000 bushels increase. It must be remembered, however, that India exported nothing last year, because of a failure of crops, and experience shows that in former years following a failure India exported very little, but rather built up a reserve. India has also been shipping more and more to fill Japan's increasing needs of wheat, so her exports to Europe will be small.

"Canada has an increase over last year in the visible supply, it being 29,799,000 bushels compared to 11,635,000 in 1921, with an increased yield of 37,000,000.

"As for the United States, the best I can figure is that we have an export surplus of about 203,000,000, compared to actual exports minus imports last year of 247,000,000."

This would indicate that there will be a good demand for American wheat, and therefore that the price may be expected to stand up. The large scale farmers of the grain country will profit chiefly by this. The bumper crops of other products, also, will be more damaging to the little farmers than to the big fellows. The ranches may be able to dispose of their big crops in bulk before the markets break; but the little farmer is faced with the prospect of seeing his potatoes a drug on the market and letting his apples rot on the ground.

On the favorable side of the scale must be reckoned the middlemen who will benefit from the good wheat situation. But the small farmer, who has been in a bad way for several years, can hardly be expected to recover this fall. And he is the man whose lack of money is keeping the remaining frozen credits unliquidated, and preventing the retail demand from booming as actively as industry would like to see it boom.

A New Process for Sugar Syrup

A NEW process designed to prevent cane sugar syrup from fermenting or crystallizing has been announced from Washington by the Federal Government. The process involves the treating of the sugar with invertase, which is obtained from malt. The sugar is changed into another product, which, however, retains all the sweetness and wholesomeness of cane sugar, but will not ferment nor crystallize no matter how thin the syrup may be made.

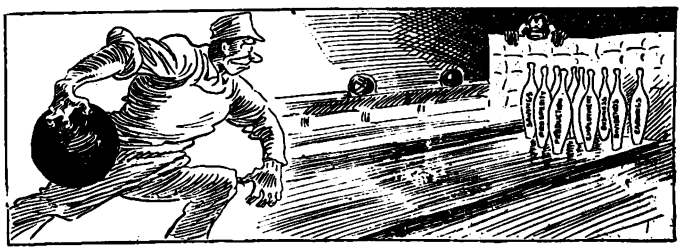


(New York World)

Look out! There's a hitch in it somewhere!



The cellar robber of next winter.



Another view of the railway strike.

Cartoons of the day from the *Chicago Tribune*

Are More Strikes Coming?

MANUFACTURERS in every line are viewing the fluctuations in the rail and coal strike situation with alarm and are asking themselves this question, "Will a complete or even a partial victory by the coal and rail employees cause my men to believe that this is a good time to strike?" It seems fairly evident that wage-earners in the coal industry and on the railroads will be at least partially successful in retaining their high post-war wages. The knowledge that these wages are above the average level plus the knowledge that the cost of living is steadily rising is certain to cause workers in other industries to become dissatisfied. If this is the case, the country will see more strikes in the near future.

As a consequence, production is likely to be lessened and wages are apt to be raised again, and the process will go on until we are again interrupted by the lack of power to purchase, and a business depression such as occurred last year will follow. With this idea in mind, the *United Business Service* of Boston has prepared a survey of past disturbances and an analysis of immediate possibilities. These are contained in the following summaries:

1. Industries in which strikes are unlikely because of defeats in recent struggles:
   - Iron and Steel
   - Textiles
   - Slaughtering and Meat Packing
2. Industries whose workers are in a poor position to weather a strike because of an extended period of depression through which the industry itself has passed:
   - Metal Mining
   - Metal Trades
3. Industries having small possibilities of early strikes because of present relative high wages and because the workers are now, after a period of abnormal dullness, enjoying a good demand for their labor:
   - Building
   - Lumber
   - Paper Manufacture
   - Automobile
4. Industries in which strikes, in which they occur, would be of local rather than national importance:
   - Clothing
   - Furniture
   - Leather
   - Printing and Publishing
   - Stone Work
   - Street Railways and Public Utilities

"The above list covers most of the leading industries in which the workers are sufficiently organized to cause strikes of any consequence. It shows that regardless of the manner in which the coal and rail strikes are settled, the prospect for strikes of national importance is very remote. In fact, about the only strikes that could successfully retard sales are the very strikes that are now in progress.

"Of further importance is the fact that strikes follow a seasonal trend just as do business activities. They reach their peak during the months of April and May because so many agreements between employer and employee terminate during these periods. The United States Bureau of Labor data reveals the following facts regarding strikes:

PERCENTAGE OF YEARLY STRIKES OCCURRING IN EACH MONTH
Based on Years 1916 to 1921

Jan.	6.80%	July	9.75%
Feb.	6.15%	Aug.	9.23%
Mar.	8.18%	Sept.	8.15%
Apr.	11.13%	Oct.	6.94%
May	14.88%	Nov.	5.22%
June	9.04%	Dec.	4.53%
		Total	100%

"In view of this table the liability of strikes gradually diminishes during the months which are now just ahead of us. Therefore, with the present strikes settled, regardless of which side wins, the outlook for business and for sales during the remainder of the year is promising."

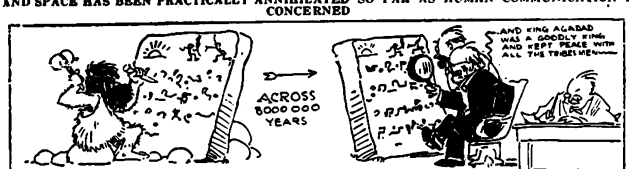
Anyone who predicted a year ago that we were going to have a shortage of labor would have been subjected to ridicule,—but we have it now. Complaints from Detroit and other automobile centres, from the building trades and especially from road contractors are merely foretastes of what will happen this fall. This shortage of labor applies especially to unskilled labor, and of course most of the wage reductions affect unskilled labor more severely than they do the more strongly organized skilled workmen. Employers who can replace unskilled labor with automatic machinery will find this an unusually favorable time for making the change. Not only will there be a saving in production costs in most instances, but there will be the additional security from labor shortage and absolute immunity from those strikes caused by wage disputes.



THE X-RAY HAS ENABLED US TO SEE THRU THE THICK-HIDED RHINOCEROS



AND SPACE HAS BEEN PRACTICALLY ANNIHILATED SO FAR AS HUMAN COMMUNICATION IS CONCERNED



AND BY PATIENT EFFORT MAN HAS REVEALED THE SECRETS AND LIFE OF OUR ANCIENT ANCESTORS



BUT BLIND PREJUDICE REMAINS IMPENETRABLE

(Philadelphia North American)

One thing science has not yet been able to accomplish.

Will Electricity Replace Gas?

Figures do not indicate such a possibility

THE manufacture of any commodity is usually considered a success when the demand for it is doubled. The annual sales of manufactured gas by utility companies have tripled in the last 20 years and doubled in the last ten. This rate of increase is still being maintained, as will be indicated by the following figures:

	Cubic feet		Cubic feet
1901	101,625,366,000	1911	159,100,874,000
1902	92,714,667,000	1912	178,228,754,000
1903	105,676,479,000	1913	188,285,840,000
1904	113,930,140,000	1914	198,838,834,000
1905	112,444,237,000	1915	204,309,522,000
1906	122,849,725,000	1916	231,381,313,000
1907	132,011,582,000	1917	264,493,003,000
1908	136,570,073,000	1918	271,593,141,000
1909	143,117,693,000	1919	306,632,786,000
1910	149,430,549,000	1920	319,887,813,000

These figures would seem to discredit the recently made assertion of Roger W. Babson to the effect that the manufactured gas industry has seen its best days, and "when a cheap method of heating by electricity is discovered, gas companies for the most part will go out of existence."

In making his prediction consigning the gas industry into the outer darkness this statistician recognized that a "cheap method of heating by electricity" would first have to be discovered. And when the present cost of electricity is considered, it does not seem likely that a reduction in the cost of electric current to a point where it could compete with gas will occur in the near future.

Although great progress has been made in the electrical industry it must be remembered that the gas industry is older and consequently its expansion could not be expected to be as rapid as that of electric power, where there has been a great untouched field which neither the steam nor the internal combustion engine could satisfactorily cover. The gas industry, however, is growing steadily stronger every year.

Moreover the gas industry of the United States is constantly developing new and improved methods for the manufacture and distribution of its product; it is constructing apparatus and devising means for its most efficient utilization; it is making energetic and successful sales efforts, and it is displacing other fuels in an increasing number of industries.

According to the U. S. Geological Survey, the quantity of gas sold during 1920 was greater than ever before, amounting to nearly 500,000,000,000 cubic feet, having a value of more than $300,000,000. The sale of by-products by gas-making companies was also greater in 1920 than in any previous year. More than 100,000,000 gallons of tar, 55,000,000 pounds of ammonium sulphate or its equivalent, and nearly 125,000,000 gallons of light oil and other derivatives were the principal items among these by-products.

In the West, and particularly on the Pacific Coast, where electricity has made rapid progress, the gas business has suffered no eclipse. According to *Gas Age-Record* conditions today are said to be brighter for the gas companies than they have ever been. On the Pacific Coast companies are from 25 to 50 miles of gas mains in arrears.

The increase in the use of gas in Los Angeles is indicated by the fact that in 1920 only 40,000 tons of coal were shipped into the city. It is reported that 90% of all food cooked in southern California is by gas. In other parts of the United States a similar growth in the gas business is reported, and as business improves it is believed the consumption of gas will be greater than it has been in the past.

How Railroads Spend Their Money

WHERE does the railroad dollar come from and how is it spent? The accompanying tables recently issued by the Illinois Central system and published by the Association of Railway Executives tell the story of the receipts and expenditures of that railroad during 1921, in the terms of cents that make up a dollar.

Where the 1921 Dollar Came From

	Cents
Transportation of freight (44,637,466 tons; average distance per ton 270.46 miles; average revenue per ton per mile 1.015 cents)	71.71
Transportation of passengers (37,027,889 passengers; average distance per passenger 25.25 miles; average revenue per passenger per mile, 3.104 cents)	16.98
Transportation of mail	1.69
Transportation of express	1.53
Sources related to freight service, such as demurrage and storage, and special service	0.49
Switching service	0.85
Sources related to passenger service, such as operation of parlor cars, excess baggage, etc.	0.56
Hotel, restaurant, dining and buffet service	0.58
Station and train privileges, and miscellaneous	0.32
Rents of equipment, road, buildings and other property, joint facilities, and miscellaneous income	2.79
Income from corporate investments	2.50
	100.00

Where the 1921 Dollar Went

	Wages Cents	Material Cents	Total Cents
Maintenance of tracks, roadbed, buildings, bridges and other structures (wages, 54.7%; material, 45.3%)	8.56	7.09	15.65
Maintenance of locomotives, freight and passenger cars and other equipment (wages, 62.67%; material, 37.33%)	11.87	7.07	18.94
Train, station and switching operations, and other transportation service (wages, 92.96%; material, 7.04%)	24.81	1.88	26.69
Traffic agencies, compilation and issuance of tariffs, miscellaneous traffic expenses (wages, 73.44%; material, 26.56%)	0.94	0.34	1.28
Hotel, restaurant, dining and buffet service (wages, 48.39%; material, 51.61%)	0.30	0.32	0.62
Fuel			7.50
Salaries of clerks and other general office employees			1.48
Legal expenses			0.18
Pension department expenses			0.16
Salaries of general officers			0.19
Valuation expenses			0.15
Miscellaneous general expenses			0.37
Depreciation and retirement of equipment			3.90
Loss, damage and casualties			1.97
Rent of equipment, leased lines, joint facilities and miscellaneous rents			2.45
Interest on bonds and other interest charges			6.85
Dividends on capital stock			4.48
Taxes			5.54
Balance available for enlarging and improving the property			1.60
			100.00

A Billion-Dollar Industry

Some interesting figures about the publishing business

WHEN you glance at an advertisement in your daily paper, do you realize that you are reading part of a book of 200,000,000 pages? And yet if all the advertising pages of all the newspapers in this country were piled together they would make a book of this size. For this is the volume of advertising appearing in the newspapers of this country every year. If these advertising pages were collected for a year they would form a volume 21,000,000 feet thick, the equivalent of 21,000 Woolworth buildings piled on top of each other. And although there are no statistics in regard to the amount of printer's ink required, the number of barrels used would undoubtedly make an imposing pyramid.

Few people really comprehend the importance of the newspaper publishing industry, says *Editor and Publisher*. Some idea of its magnitude may be gained from Mr. Hearst's recent advertisement in the trade press in which he stated that his volume of business in 1921 amounted to $80,000,000. His earnings are now reported to be about $1,000,000 a month.

Other publishers have made equally noteworthy records. The earnings of the Scripps organization last year were in excess of $25,000,000; and the volume of business of the New York Times is reported to have been $15,000,000. The Booth Publishing Company of Michigan showed more than $5,000,000 total earnings during 1921.

The volume of earnings reported to the Federal census bureau by the publishing and printing industry of the country in 1919 was $924,000,000. This figure includes earnings of newspapers, magazines, class and technical and farm papers. The raw materials, including freight and cost of manufacture, represented approximately $300,000,000. The value added by manufacture amounted to $623,000,000. Of this $924,000,000, advertising and circulation revenues constituted approximately $806,000,000; the remainder was accounted for by the volume of pamphlets, machine composition, etc.

Of the 17,362 establishments that were surveyed or reported in the census in 1919, 97% were newspapers, dailies and weeklies, tri-weeklies and semi-weeklies. The total invested capital of the 17,362 establishments amounted to $640,000,000.

The volume of newspaper business in 1919 amounted to $566,321,000, distributed as follows: $373,000,000 advertising, $192,000,000 circulation. There were 160,041 people employed as executives and employes. The salaries and wages paid in that year amounted to $204,000,000. The rents paid were $7,000,000; the federal taxes $10,000,000; State taxes $3,000,000.

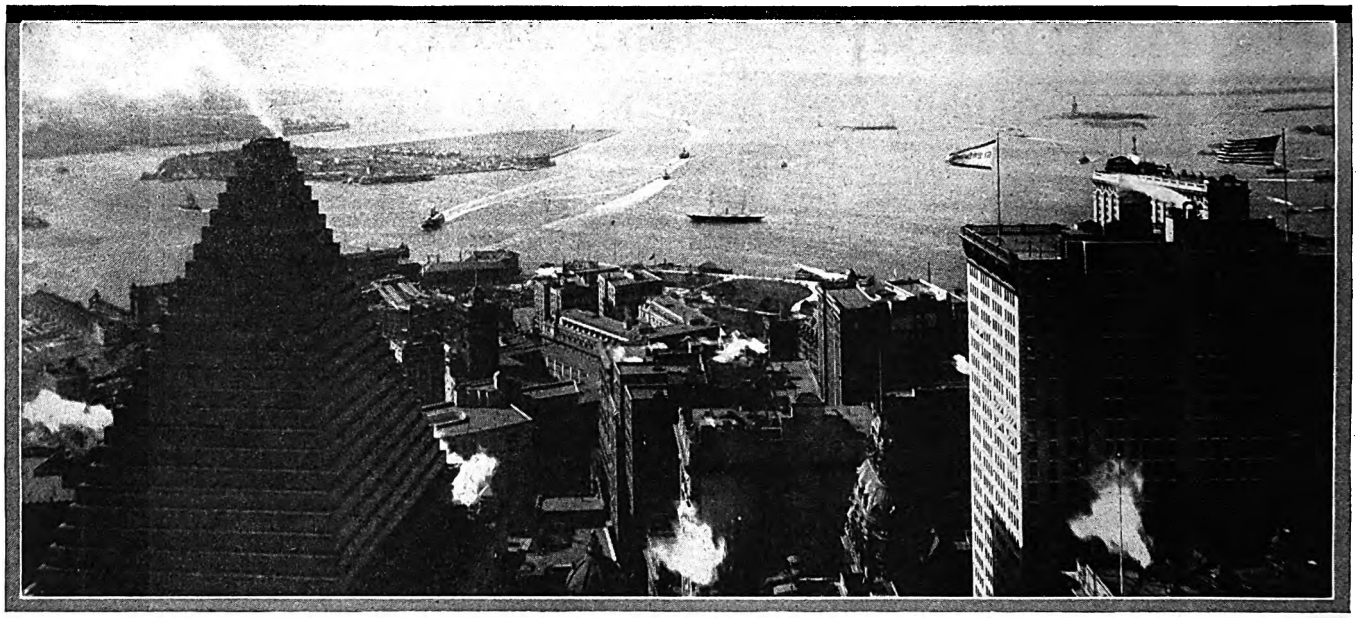
Editor and Publisher points out that another indication of the power and influence of the newspaper is furnished in the circulation figures reported to the Government and the A. B. C. on April 1 of the current year—421 morning newspapers had a net paid daily average circulation of 10,200,000 copies, with a joint line rate of $26.71 and a milline rate of $2.55 per million paid circulation; 1,596 evening newspapers had a net paid daily average circulation in excess of 18,800,000 per day at a joint line rate of $61.05 and a milline rate of $3.23; 543 Sunday newspapers had a combined net paid average circulation in excess of 19,700,000 for Sunday with a joint agate line rate of $44.41 and an average rate of $2.25 per line, per million subscribers.

The census reports show that the newspapers in 1919 reported a sale of 8,000,000 copies per day more than in 1909, an increase from 24,000,000 a day in 1909 to 33,000,000 a day in 1919; 604 Sunday papers reported a net paid circulation of 19,000,000 in 1919 as compared with 520 papers in 1909 and a net paid circulation of 13,000,000, an increase of 6,000,000 Sunday papers in the ten-year period.

Twenty-five Things Likely (?) to Happen

ANYONE who assumes the role of business prophet in these tempestuous times takes a heavy chance on being wrong. It is with a great deal of interest, therefore, that the reader will go over the list of important developments which a writer in *Forbes Magazine* believes that we are likely to witness within the next few months or, at most, a year. If you are one of the "I-told-you-soers" you may want to refer to the list a year from now and see whether your guess was better than the writer's. Here is the list:

1. Rather acute scarcity of unskilled laborers.
2. A rising tendency in wages.
3. Serious congestion on the railroads, with grave delays in the delivery of goods.
4. Sharp rises in not a few industries.
5. A further advance in cotton and cotton goods.
6. Greater expansion in imports than in exports.
7. Some revival in shipping.
8. Distinctly higher money rates, starting very shortly.
9. Less voracious absorption of new security offerings.
10. Increased activity in stocks and decreased activity in bonds, with more or less bullish excitement in stock speculation.
11. Scarcity of a few classes of merchandise and many instances of clamoring for immediate delivery.
12. Harvesting of satisfactory crops and freer buying throughout the grain-growing States, with somewhat improved conditions also in the South.
13. Cheaper coal.
14. Lowering of rents.
15. November election results which will spur the Republican law-makers to conduct themselves in more businesslike fashion.
16. Recognition of Mexico.
17. Pacification of Ireland.
18. An upheaval in Germany, precipitated by the hardships imposed upon the working classes by the collapse of the mark's purchasing value.
19. Further abandonment of Soviet policies in Russia.
20. Drastic modification, or cancellation, of Europe's indebtedness to Britain.
21. Readjustment of the German reparation burden, modification of France, and then a large international German loan.
22. Thereafter, rapid progress in European rehabilitation.
23. Heavy investment by America in foreign enterprises.
24. Further revival of optimism in this country.
25. And, generally, gradually improving times.



The financial district in New York in which many of our largest corporations have their offices.

What the Big Corporations Have Done

Records show that the last seven years have been "years of plenty" for most of the large industrial organizations

LET us forget for a moment the coal strike, the summer dullness and the industrial depression that is with us still. Instead of occupying ourselves exclusively with the conditions of the moment, let us look at the records of America's industrial growth during the past seven years, and see if we cannot find something to smile about.

Dow, Jones & Co. have just published a book called "Industrial Expansion, 1914 to 1922," which surveys the development of 144 great industrial corporations during that period. According to this survey, a majority of the corporations are richer and stronger today that at any other period in their history, in spite of the trying strain to which they were subjected in 1921.

On. December 31, 1921, these 144 corporations had a total working capital of $4,306,708,230. On December 31, 1914, their working capital was $2,036,611,447. In other words, in seven years they gained $2,270,096,783—more than 100%. In spite of the increase in wealth over 1914, inventories today are only slightly larger than they were seven years ago. The figure for December 31, 1921, is $1,730,217,302, and that for December 31, 1914 is $1,281,306,304. An entirely different story would have been told if the comparison had been made a year ago, when the inventories of the 144 corporations totaled $3,745,510,950. The decline in inventory values during 1921, according to these figures, was $2,015,293,648.

"It is evident from the heavy shrinkage last year that most companies have properly adjusted this item," says the survey. "In other words, the danger from inventory inflation which demoralized business and security values was passed last year.

"Considering the great growth in business over the last seven years, higher prices for raw material, etc., the working assets of these 144 corporations at the end of last year was very close to what might be termed normal. The volume or tonnage of goods in process is about that of 1914, as prices are now higher.

"A vast amount of surplus earned by industry over the past seven years has gone into new construction and working capital. It was necessary for many corporations to raise money for new construction during the war period because of extraordinary demands created for products by the war. Higher prices for products also demand more capital.

"Capital liabilities, less dividends in stock, from December 31, 1914, to December 31, 1921, increased $2,165,209,624.

"The greater part of this increase can be traced to a few companies, as follows:

General Motors	$263,861,337
Texas Co.	136,681,705
Bethlehem Steel	155,225,197
Armour & Co.	136,264,300
Swift & Co.	133,923,500
U. S. Rubber	110,365,800
Du Pont	97,567,331
	$1,033,889,170

"One half the net increase in capital liabilities reported by the 144 corporations was confined to the seven companies that make up the table.

"But there were some notable exceptions. U. S. Steel in the seven years not only cut down its capital liabilities $88,587,612, but at the same time added $293,778,533 to working capital. More remarkable still, from 1915 to 1921, inclusive, $582,873,084 was spent for actual new construction. The total of these three items is $965,239,229, equal to $190 a share on the common stock.

"The showing of U. S. Steel eclipses that of any other corporation. It has a working capital of $536,785,243, including sinking and reserve fund assets, of which $255,243,907 is in cash and investment securities. Steel's cash is equal to almost 20% of the total of the 144 corporations. Its surplus after dividends for 1915 to 1921, inclusive, is equal to $90.30 on the common stock. Nothwithstanding the fact that 1921 was the most trying year in the history of the steel industry, U. S. Steel's deficit was equal to only $2.76 a share on the common. This compares with $26.22 for Republic, $11.14 for Lackawanna and $3.16 for Midvale. Bethlehem made the best showing of the steel companies, with a surplus equal to $6.50 a share on the common after preferred and common dividends.

"Many corporations lost money last year. Losses were due to poor business, low prices and depreciated inventories. Some companies lost all they made during the war. American Agricultural's deficit was equal to $42.40 a share on the common; Armour & Co., $37.26; Atlantic Refining, $95.26; Atlas Powder, $35.85; Central Leather, $29.35; Cuba Cane Sugar, $41.44; International Paper, $43.25; Morris & Co., $39.91; Pierce-Arrow, $35.85; U. S. Rubber, $21.32; Virginia-Carolina Chemical, $67.20, and Wilson & Co., $45.50.

"On the other hand, there were certain corporations that showed substantial surpluses after dividends in 1921. As an example, Vacuum Oil, after dividends, showed a surplus equal to $33.05 a share; American Bank Note, $9.51; American Ice, $13.43; American Locomotive, $7.33; Associated Oil, $14.50; Eastman Kodak, $28.91; Electric Storage Battery, $10.54; Kresge, $17.91; Liggett & Myers, $13.45; May Department Stores, $16.32; Mexican Petroleum, $14.71; Standard Oil of Kentucky, $33.29; Studebaker, $9.21; United Fruit, $8.98; U. S. Realty, $16.73; Victor Talking Machine, $43.80, and F. W. Woolworth, $11.80.

"Many corporations, in spite of depressed conditions which began during the latter part of 1920, made heavy additions to value a share of common stock from 1914 to 1921, inclusive. As an example, U. S. Steel shows an addition to value of $90.30 a share; American Car & Foundry, $96.22; American Can, $51.04; Baldwin Locomotive, $166.10; Bethlehem Steel, $163.45; American Woolen, $59.73; American Locomotive, $113.18; Corn Products, $73.17; Du Pont, $116.73; Eastman Kodak, $231.74; Lackawanna Steel, $68.69; May Department Stores, $56.65; Republic Iron & Steel, $76.53; Sears-Roebuck, $43.30; Standard Oil of Kentucky, $178.96; Standard Oil of New York, $200.30; Studebaker, $44.64; Vacuum Oil, $295; Victor Talking Machine, $429; F. W. Woolworth, $41 and Worthington Pump, $54.25.

"Many of these companies retained a large percentage of their surplus earnings during the seven years in working capital. Others spent more money for construction than retained in working capital. It will also be noted that notwithstanding great profits piled up during the war certain corporations reported a smaller amount of working capital than their respective statements showed on December 31, 1914."

Fingers in the Sugar Bowl

Trying to extract profit from our national sweet tooth

IT is a matter of common knowledge that there are a number of items in the Fordney-McCumber Tariff Bill that appear to have been placed there for profiteering purposes. One of the most flagrant examples is that of the proposed duty of $1.84 per hundred pounds on cane sugar, which will, if it goes into effect, mean that the price of sugar will sell at from fifteen to thirty cents over the retailer's counter. The only people that can possibly benefit from the increase in the tariff rates will be the growers of beet sugar, whose interests, it is asserted, have been carefully guarded by a group of senators under the leadership of Senator Reed Smoot, of Utah.

In spite of the fact that $1,000,000,000 of American capital is invested in the Cuban cane sugar enterprises, it was recently charged in the New York *World* by Henry A. Rubino, the operating executive of several large Cuban sugar-producing companies, that every effort has been made to limit the amount of Cuban sugar sold in the American market. One of the earlier schemes was to persuade Cuban planters to limit their production to 2,500,000 tons a year. Mr. Rubino claimed that Secretary of Commerce Hoover and Major-General Crowder took part in this attempt to restrict production. Mr. Hoover has denied this. And when this effort failed, the only resort, apparently, was to raise the tariff wall still higher. Yet the beet sugar industry in the United States is comparatively small. It supplies scarcely 15% of the country's sugar needs and is used chiefly in the West and Far West. And in order to protect this industry it is proposed that every man, woman and child in the United States must pay a tremendous tribute.



(Will Dyson in the London Daily Herald)

Fate of an explorer searching for foreign markets that can afford to buy.

The real need for Cuban sugar is proved by the fact that, although the beet sugar emissaries did not succeed in forcing a restriction of the Cuban crop, there are, at this time, only 200,000 tons of sugar left in Cuba to fill the requirements of the world, including the United States. It is estimated that if the crop had been limited to 2,500,000 tons there would have been no sugar in the United States for the last sixty days—which would have enabled the beet sugar people to sell all of their product at tremendous prices.

According to the *New York World*, the actual capital invested in the beet industry—about $175,000,000—has been repaid many times over, due to the high protection which it has enjoyed for years. It is pointed out that there are seventeen Western States producing beet sugar, each having two senators and a corresponding number of representatives, and that "the only argument in favor of a protective tariff on beet sugar lies in the fact that there are thirty-four senators from States where it is grown."

Owing to the increased consumption of sugar, both in this country and in Europe, and to the fact that the other sugar-producing countries have reached the limit of their production, while Cuba has not, this country is likely to become more and more dependent upon Cuba for sugar. It is also pointed out that increased duties on sugar will add to the financial requirements of refineries, and in many cases increased money will have to be borrowed for operating expenses. There will be a material loss of interest and carrying charges upon inventories, also upon drawbacks due by the Government on exported sugar. Millions of dollars are likely to be tied up.

Rubber Plants Flourishing

Not the parlor variety, but solid, substantial factories

GOOD rubber stands a great strain without breaking, because it is elastic. To a certain extent the same thing may be said of companies engaged in manufacturing. They must be elastic enough in the matter of resources to stretch over the period of bad times, with enough potential demand to contract when the depression is over. A fine example of this elasticity is in the rubber industry itself. That bank debts totaling more than $75,000,000 and inventories of raw materials running into even larger figures at the beginning of the depression did not prove disastrous indicates that conditions in the industry are fundamentally sound.

India Rubber World points out that the renewed confidence in the industry is evidenced by the oversubscription to the bond issue of the B. F. Goodrich Company. This issue was oversubscribed by more than $70,000,000 when it was offered to the public. That this issue would attract sufficient buyers to close the books the same day it was offered was anticipated but that the subscriptions would amount to $90,000,000 when the original offering was only $20,000,000 was certainly not expected.

Nor does the Goodrich bond sale stand alone as a barometer of the new financial confidence. It was rumored early in July that one of the other large companies would be compelled to float a bond issue of several millions and that bankers wanted loans due at the beginning of the coming month paid off. But investigation has shown that not only had the bankers entirely altered their opinion but that they had offered the company any amount of loans. up to $7,000,000 if they were needed. It is believed that the July report will show all records broken, since the middle of 1920 in all lines of manufactured rubber goods.

The statement issued by the B. F. Goodrich Company during the latter part of July sums up the rubber situation in Akron:

"Tire sales are breaking all previous records. Business booked during the past 60 days far exceeds that of any 60-day period in the history of the company.

"Cord tire sales for the first half of 1922 show an increase of 100% over those of the same period last year. June tube sales have never been approached in the history of the company.

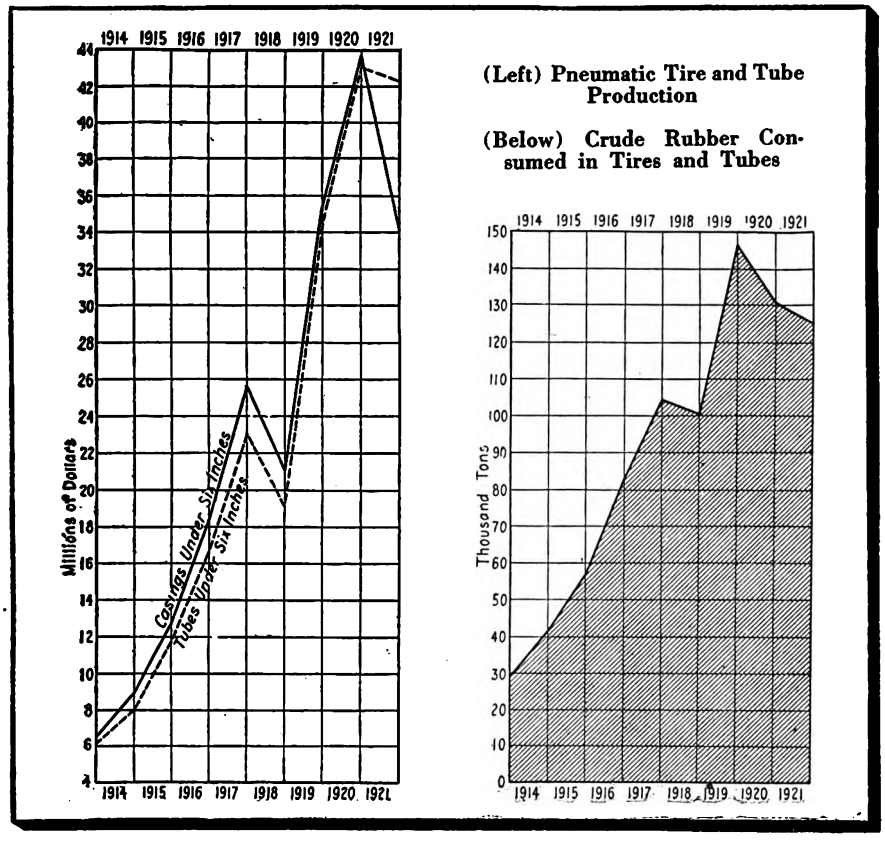
"Solid tire sales are running double the rate last year and are increasing month by month. Present volume of business is expected to continue. Sales of mechanical goods are climbing weekly and are now greater than at any time since the summer of 1920. The output of several departments now exceeds all previous records. Footwear sales are highly satisfactory.

"The company is doing a large foreign business."

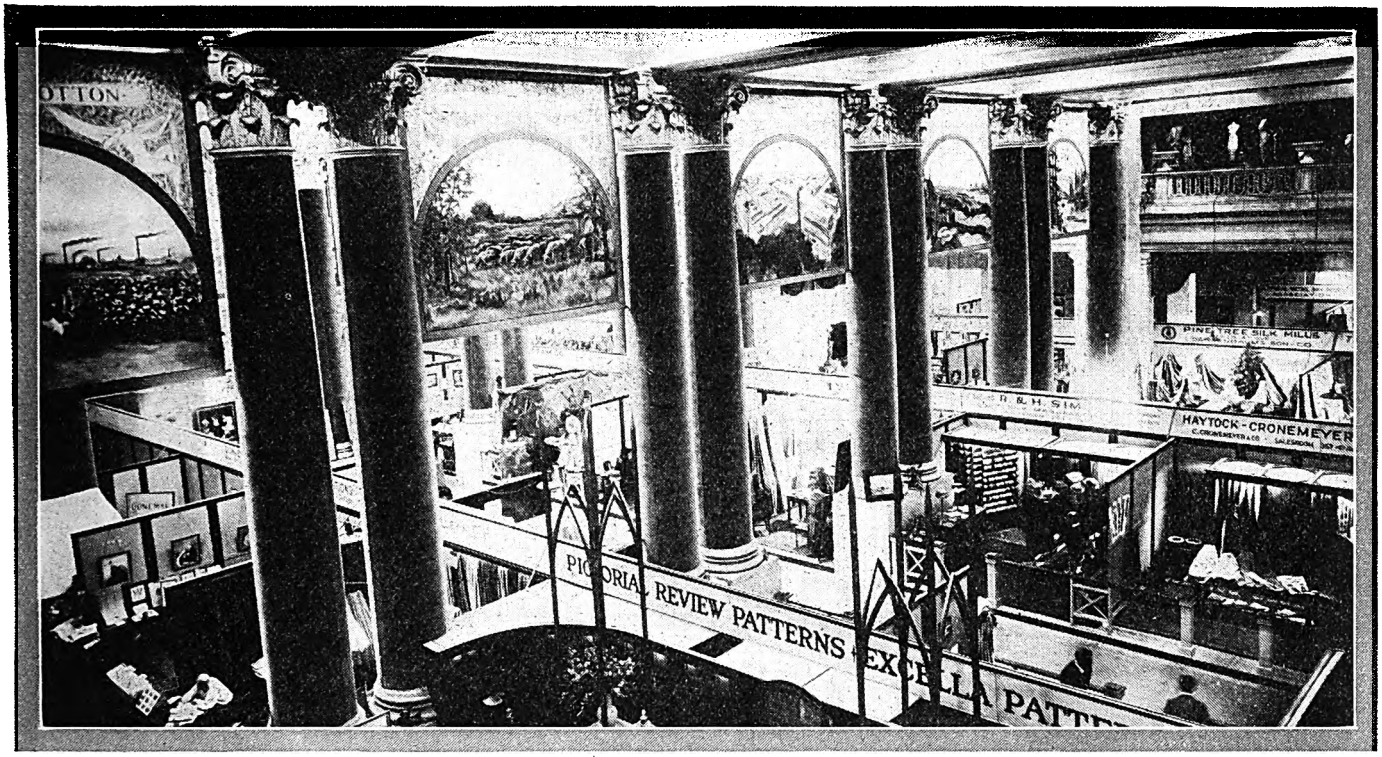
Similar reports of improving business appear to be the rule in other sections of the country. The manufacture of rubber goods in Massachusetts continues to justify the optimistic prophecies that have been made. In light mechanical lines business is said to be very good, while factories specializing in belting, packing and heavy hose are operating at about 60% capacity. The demand for molded goods and rubberized fabrics is improving and insulated wire and automobile topping continue in active demand. At the recent shoe and leather exposition and style show, held in Mechanic's Building, Boston, rubber and canvas footwear, rubber heels and soles were a more prominent feature than they have ever been before.

Encouraging statements continue to be made by rubber manufacturers in New Jersey. Nearly every rubber mill in Trenton is being operated to its full capacity. Tire manufacturers report more than the average summer demand. Although in some of the Eastern rubber mills there has been a lessening of demand due to tire production which continues at the same level, especially in the output of small-size tires that are being manufactured to meet competition. The reduction in tire prices that was made by certain large manufacturers appears to have had a stimulating effect on Eastern sales.

In spite of the customary drawbacks of midsummer, rubber manufacturers and dealers on the Pacific Coast are well pleased with trade conditions. Recent price cuts on the smaller sizes of tires have so stimulated sales that not only have the unit sales been amost double those of the same period a year ago, but the gross sales receipts have been considerably above the total for the June 15-July 15 period of 1921. No decrease has been reported in the demand for mechanical rubber goods. Big oil companies and "wild-catters" are using a great deal of rubber for pumps, for hose suction and discharge of oil, and for cementing wells by means of armored hose, carrying liquid concrete under 1200 to 1500 pounds pressure. As a result of activity in the copper mining industry heavy demands are being made on the Coast branches of Eastern rubber manufacturers.



Tire production and rubber consumption in tires, 1914-1921.—*(India Rubber World.)*



A corner of the Merchandise Fair in New York

The Showroom of an Industry

How the dry goods manufacturers have simplified buying for their customers by means of a national merchandise fair

ABOUT this time every year the retail dry goods buyers from Seattle, Tampa and intermediate points travel to New York City to buy fall goods. They shop around among the manufacturers and jobbers of the big city, inspecting lines and comparing merchandise and prices. They must select goods that will sell at a profit during the coming season—a task as difficult as any which ever confronts a business man.

This year things are being made a little easier for the buyers by the first National Merchandise Fair. Some 900 manufacturers and jobbers of dry goods have assembled their wares in two large buildings, and instead of traveling from showroom to showroom all over New York City, the buyers can now attend the fair and pass before rows of booths, each containing the samples of a different wholesaler. They find there the same salesmen who used to shoot selling talk at them in the showrooms; the same carefully displayed lines of goods and (if they are buying women's garments) the same engaging manikins. The only difference is that they are saved a great deal of leg work, they have all conveniences (such as telephone booths and telegraph offices) at hand on the scene of the buying, and the entire market is presented for their inspection at a glance.

The fundamental idea of the National Merchandise Fair is borrowed from Europe, whose buyers and sellers have been convening for years at the fairs of Leipzig, Paris and other commercial centers. It is not an exposition, attended by the trade and general public for the purpose of seeing the latest technical and merchandise developments; it is a fair, for the purpose of buying and selling. Only exhibitors and buyers for retail stores are admitted. The general public and manufacturers not exhibiting cannot get through the gates.

The fair is conducted under the auspices of two trade associations: the National Retail Dry Goods Association and the National Garment Retailers' Association. No men's clothing associations are represented, and men's clothes are not exhibited. These, it will be observed, are associations of buyers, not of sellers. They are running the fair primarily for the benefit of the buyers. The fair looks much like a large department store. Similar exhibits are grouped together in booths, ranged side by side along the aisles. There are few elaborate displays; most of the exhibitors are content merely to set forth their goods upon counters, as they would in their own showrooms. The appearance of the place makes it apparent that this is a commercial institution, arranged for the benefit of buyers and sellers, and not a show.

The purposes of the event are explained in these words by the National Retail Dry Goods Association:

"It can easily be seen that the fair will result in an immediate saving in the matter of buying expense, for buyers visiting the New York market will be able to see hundreds of lines in less time than it usually takes to see a few lines. Another point is the indirect economy that will result. This will come from the fact that buyers will be able to buy more intelligently because they will be in touch with many more lines than they have ever seen before, and they will also see lines of manufactures which in the ordinary course of business they would not see at all. Practically every retail merchant has the idea that his buyers never see enough goods. The Merchandise Fair is the answer.

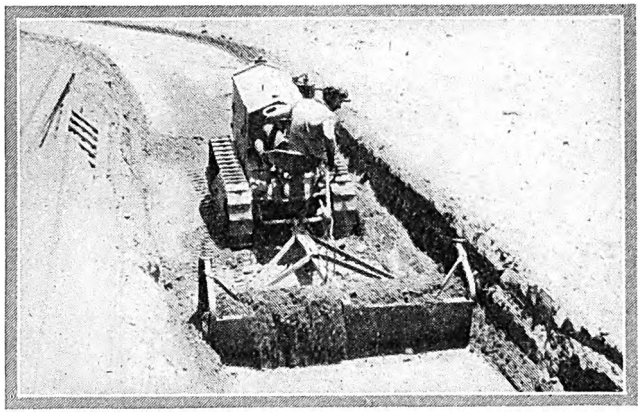
"One object of the fair is to assemble in both big buildings the merchandise lines of hundreds of manufacturers for the convenience of visiting buyers at a time when stocks need replenishing. In this way the manufacturers and buyers will be brought together as they never have before and many of the ills that have been the product of lack of understanding, and even misunderstanding, between the two will be eliminated.

(Turn to page 1457)

Improvements and Inventions

Dyeing Two Colors at Once

THE art of dyeing fabrics is ancient. The early Egyptians knew how to color their fabrics beautifully. They even knew how to dye a piece of cloth two colors by using different mordants or fixatives, which fasten the color to the textile. Recently, however, a real new development in dyeing has taken place, due to the discovery of a new class of dyestuffs. This discovery is of English origin and the new dyes are called ionamines. A peculiar thing about the dyes is that they will color artificial silk only. They have no effect on any other fabric. When a bath is made up, containing a direct cotton dye of blue and one of these new dyestuffs, possessing a red color, a piece of cloth made of cotton with silk threads will be colored blue in the cotton part and red in the silk part.



New excavating machine and driver in 40 hours do 10 days' work of 10 men and 16 horses. The picture shows the machine used as a ditch digger. It consists of an intricate "hitch" by which a 6-foot scoop is attached to a tractor. The driver can, without leaving his seat, load the scoop and dump it at any required spot.

Lubricant from Wood Tar

IN the distillation of wood, a tarry product is obtained which has been used for various purposes of no very great importance. Recently, however, a rather important use has been developed for this product. It has been made into a lubricating oil for use as a substitute for mineral and vegetable lubricating oils. The process is of German origin and the success that has been secured with it recommends it for further application in this country as well. The tar is distilled and an oil is obtained which is acid and which quickly thickens on exposure to air. These properties render it unsuitable for lubricating purposes, but a simple treatment eliminates these disadvantages and produces an oil which can be used safely in lubricating bearings, etc. The oil is treated with caustic lime and air is blown through until the oil no longer thickens on standing in the air; that is, it no longer will absorb oxygen.

Paper from Corn Stalks

IT has always been a problem just what to do with the large quantities of corn stalks that must be got rid of each year in those countries where the corn crop is large. Ordinarily, the stalks are burnt on the field. In Hungary, a land where large crops of corn are grown each year, a process has been developed recently for treating corn straw so as to make paper and other valuable by-products out of it. The details of this process have been reported to the Hungarian Academy of Sciences. The process, which is known as the Vegyi Ipar, yields 40 pounds of cellulose, 40 pounds of molasses and 5 pounds of artificial fertilizer from every 100 pounds of straw. The cellulose can be used for the manufacture of paper. The considerable value of these by-products makes this process much more advantageous than the ordinary method of obtaining cellulose from wood chips.

Rubber Cement Removes Grease Stains from Leather

MANUFACTURERS of leather goods, dealers, rubber cement makers and the public in general will be interested to learn that the Government has developed an exceedingly simple and effective method for removing grease stains from leather. Nothing is more unsightly than a handbag, shoes, traveling baggage, or in fact any leather article that has been stained by coming in contact with butter, lard, vaseline, oils of all sorts, and similar products, and there is perhaps nothing more difficult than leather to cleanse of these spots. Trying to remove the spot in the ordinary way by rubbing the stained leather with a rag soaked in gasoline or benzine results only in spreading the spot further. However, when a rubber cement is used, of the ordinary kind sold on the market for repairing or glueing rubber, highly satisfactory results can be obtained. The liquid in which the rubber is dissolved must also be able to dissolve the spot, and as most rubber solvents are also fat and oil solvents, this condition offers no difficulty. A rubber cement, made with gasoline or carbon disulphide, can be used with excellent results. The cement is merely smeared over the spot on the leather, and when the film of rubber is just about dry, it is easily peeled off. Almost every time, on first trial, the spot comes off with the rubber. Sometimes the operation must be repeated once or twice. The rubber cement can be made by dissolving one part of unvulcanized rubber in ten parts of the liquid.

Glass That Will Not Break

A GLASS that can be heated and then cooled rapidly without any danger of breaking has been put on the market in Belgium. Kitchen utensils and chemical apparatus can be made from this glass without any difficulty. The only difference between this product and common glass is that boric acid is used in place of sand.

Cracking Petroleum Direct

THERE have been so many processes developed during the past few years which have been heralded as the "only real solution" of the gasoline problem, that oil refiners have become almost deaf to requests for hearings from "gasoline" inventors. But in France a new process has recently received the careful and official attention of French governmental administrators interested in the gasoline problem. The process is called the Seigle. It is said to produce gasoline from crude oil, shale oil, various heavy oil products, and even still residues, in one step, in contradistinction to the cracking processes known and used up to the present time, which require two distinct operations. The process is said to work successfully and that the yield of gasoline is very high. The gasoline product will dissolve perfectly in alcohol, a fact which is of special importance in the manufacture of composite motor fuels.

Moth-Proof Wool

TEXTILE manufacturers will welcome the news that a moth-repellent has been introduced in the German market which, it is claimed, will positively make the wool fabric absolutely moth-proof. An additional advantage of this product, known as Eulan F, is that it does not discolor the fabric, so that the wool can be dyed in bright shades without any difficulty. The product is a white powder which does not dissolve very easily in water. Acid must be added to make it dissolve. In this condition it is used in the textile mill, and it is preferable to put the woolen fabric through the moth-proofing treatment in the factory.



Basic Commodity Prices

(Minimum, at New York, unless otherwise specified)

	Week Ending Aug. 12	Week Ending Aug. 5	Year Ago
Aluminum, pig (ton lots), lb	.17	.17	.20
Antimony, ordinary, lb	.0575	.0575	.05375
Brick, Hudson R., per M	21.00	21.00	15.00
Cement, Portland, bbl	1.70	1.70	2.15
Copper, Electrolytic, lb	.14	.14	.12
Cotton, spot, Mid. Upl., lb	.2105	.2145	
Hides, Chic. Pack., No. 1, lb	.20	20	.14
Lead, N. Y., lb	.058	.058	.044
Petroleum, crude, at well, bbl	3.00	3.00	2.25
Pig iron, Bessemer, Pgh., ton	28.76	26.76	21.96
Pine, roofers 6 in., M. ft	31.00	31.00	26.00
Rubber, Up River, fine, lb	.19	.19	.16
Silks, Sinshui, No. 1, lb	7.00	7.20	5.75
Spelter, N. Y., lb	.066	.0665	.0455
Steel Billets, Bess., Phg., ton	35.00	35.00	30.00
Tin, N. Y., lb	.32125	.32	.2625
Wool, Dom., ½ blood com., lb	.50	.50	.29

Wholesale Commodity Prices

Coal—			
Bit., ¾ in., lump, net ton	...	...	...
Anthracite, egg, net ton	...	...	...
Coke, furnace, net ton	14.00	14.00	2.75
Cotton Goods—			
Brown Sheetings, Std. yd	.13	.13	.095
Standard Prints, yd	.1025	.1025	.11
Print Cloths, 38½ in., 64x60, yd	.08375	.0875	.07125
Drugs and Chemicals—			
Alcohol, ethyl, form 5, gal	.31	.30	.34
Alcohol, wood, 95%, gal	.57	.57	.78
Alum, lump, lb	.0325	.0325	.035
Bleaching Powder, over 34%, 100 lbs.	1.60	1.60	2.15
Borax, crystal, in bbl., lb	.06	.06	.06
Caustic Soda, 76%, 100 lbs	3.60	3.50	3.70
Lime, factory, 200-lb. bbl	1.90	1.90	...
Nitric Acid, 42°, lb	.065	.065	.07
Saltpeter, crystal, 100 lbs	.0775	.0775	.1075
Soda Ash, 58% light, 100 lbs	1.75	1.75	1.80
Sulphuric Acid, 60%, 100 lbs	.45	.50	.60
Flour—			
Spring Pat., 196 lbs	7.00	7.00	8.00
Winter, soft str't, 100 lbs	5.00	5.00	6.00
Grains—			
Wheat, No. 2 Red, bu	1.22	1.23	1.375
Corn, No. 2 Yellow, bu	.8025	.82	.8125
Oats, No. 3 White, bu	.44	.44	.465
Rye, No. 2, bu	.8925	.88	1.215
Barley, malting, bu	.73	.74	.77
Hay, No. 1, 100 lbs	1.45	1.50	1.50
Straw, lg., rye, No. 2, 100 lbs	.95	.95	1.10
Hides—			
Cows, heavy native, lb	.1875	.1875	.13
Country, No. 1 steers, lb	.145	.145	.08
Iron and Steel—			
Basic, Valley furnace, ton	26.00	25.00	18.00
Steel bars, Pittsburgh, 100 lbs	1.80	1.70	1.75
Beams, Pittsburgh, 100 lbs	1.80	1.70	1.85
Galvanized Sheets, No. 28, Pittsburgh, 100 lbs	4.15	4.15	4.00
Leather—			
Hemlock, sole, No. 1, lb	.29	.29	.28
Scoured oak backs, No. 1, lb	.50	.50	.55
Lumber—			
FAS Qtd. Wh. Oak, 4/4", M. ft	145.00	145.00	145.00
Tonawanda Wh. Pine No. 1 barn 1x4", M. ft	82.00	82.00	90.00
Adirondack Spruce, 2x4", M. ft	38.00	38.00	48.00
No. 1 Com. Y. Pine Bds., 1x4", M. ft.	44.75	44.75	37.00
Oils—			
Coconut, spot N. Y., lb	.085	.085	.10
Crude, tks, f.o.b., coast, lb	.07	.07	.08
China Wood, bbls., spot, lb	.1225	.125	.13
Cottonseed, lb	.11	.11	.087
Linseed, city, raw, gal	.93	.92	.79
Paraffine wax, ref., 125 m. p., lb	.035	.035	.035
Turpentine, gal	1.13	1.16	.66
Paints—			
White Lead, in oil, lb	.125	.1250	.1225
White Lead, dry, lb	.0725	.0725	.065
Zinc., Amer., lb	.07	.075	.075
Paper			
News roll, 100 lbs	3.75	3.75	4.75
Book SS. & C., lb	.075	.075	.0775
Wood Pulp, ton	75.00	75.00	80.00
Sugar—			
Cent. 96°, 100 lbs	5.36	5.48	4.86
Fine Gran., in bbls., 100 lbs	7.00	7.00	6.00
Wool—			
Boston Aver. 98 quot., lb	.7071	.7398	.4173
Stand. Clay Wor., 16-oz., yd	3.00	3.00	2.85
Fancy Cassimere, 13-oz., yd	2.45	2.45	2.25
Serge, 36", Wor., yd	.52	.52	.52
Broadcloth, 54", yd	2.75	2.75	2.50
Cottonwarp serge, 36", yd	.45	.45	.45

Financial

Bank Clearings	Week Ending Aug. 12	Week Ending Aug. 5	Year Ago
New York	$3,669,039,190	$4,372,181,788	$3,209,530,463
Chicago	521,782,746	537,665,188	471,435,834
Entire Country	6,825,000,000	7,673,000,000	6,010,000,000
Increase or Decr.	+13.5%	+8.7%	—23%
(Per cent of total from preceding year)			

Cost of Money—New York	Week End. Aug. 12	Week End. Aug. 5	Year to Date	Year Ago
Call Loans	5@3½	5@3	6@2¾	6
Time Loans (60-90 days)	4¼@4	4¼@3¾	5@3½	6@5¾
Six Months	4½@4	4½@4	5@3¾	6@5¾
Com.Discount,4-6mos.	4½@4	4½@4	5@4	6¼@6

Financial Transactions	Week Ending Aug. 12	Week Ending Aug. 5	Year Ago
Stock Sales, shares	3,309,424	2,377,390	2,152,041
Aver. Price, 25 Railroads	67.64 h. 66.25 l.	66.42 h. 64.88 l.	53.64 h. 52.53 l.
Aver. Price, 25 Industrials	103.23 h. 101.54 l.	102.72 h. 100.81 l.	72.99 h. 70.12 l.
Sales of Bonds, Par Value	$67,706,747	$71,429,000	$54,094,450
Aver. Price, 40 Bonds	81.63 h. 81.41 l.	81.45 h. 81.21 l.	70.94 h. 70.28 l.
Average Net Yield, 10 High-Grade Bonds	4.435%	4.450%	5.312%
New Security Issues	$22,351,000	$28,074,900	$23,250,000

Business Failures	Week End. Aug. 11	Week End. Aug. 4	Year Ago
Number	402	347	361
	July, 1922	June, 1922	July, 1921
Liabilities	$36,900,000	$38,242,450	$42,774,153
Number	1,753	1,740	1,444

Industrial

Building Permits	July, 1922	June, 1922	July, 1921
	$188,155,537*	$258,674,449†	$135,327,833*

*149 cities. †141 cities.

Idle Freight Cars	June 30, 1922	June 15, 1922	May 31, 1922
Number	405,185	442,253	486,846
Car Loadings	July 29, 1922	July 22, 1922	July 1, 1922
Number	859,733	861,124	876,896
Steel and Iron Barometer	July 31, 1922	June 30, 1922	July 31, 1921
U. S. Steel Orders (tons)	5,776,161	5,635,531	4,830,324
Daily Pig Iron (Prod.) tons	77,421	78,701	27,889
Monthly Pig Iron (Prod.) tons	2,400,045*	2,361,028†	864,555*

*Month of July. †Month of June.

Foreign Trade	June, 1922	May 1922	June 1921
Exports	$334,000,000	$307,688,622	$336,958,412
Imports	260,000,000	252,817,254	185,679,893



WITH THE FINANCIERS

Market Inactive

FAVORABLE or unfavorable news has made little difference to the financial markets during the past few weeks. On days when news of the railroad strike seemed unusually discouraging the prices of stocks would, as likely as not, rise a fraction. On other days prices would fall off a little, for no apparent reason. It is a typical midsummer market, inactive and not particularly nervous.

Through all the inactivity and fractional fluctuations an optimistic spirit prevails. In spite of apprehensions rather freely expressed elsewhere, the financial markets are going quietly and cheerfully on their way. Judging only from the movement of prices on the Stock Exchange, as one writer remarks, "the casual observer might have imagined that nothing of great importance to the financial situation was happening, but that the general drift of events was favorable."

Some persons have expressed the opinion that stock prices have been kept up artificially by the operations of insiders who are not ready yet to let things go. It is always possible to find someone who will explain any stock market situation on the theory of inside manipulation. But it is not necessary to make any such assumption. Sufficient explanation may be found in the fact that Wall Street doesn't think the strikes are as serious as many other persons would have us believe, and that the financial district believes that underlying financial conditions are sufficiently favorable to counteract any temporarily adverse situation which may arise from the strikes.

Money Continues Easy

CONTINUED easiness of money is one of these favorable elements. Money has tightened slightly on several occasions during the past few weeks, but it has always slid back, and its actions alarmed no one. It is time now for a general rise in money rates, due to the necessity to move the crops. But few persons express fear of a real tightening such as would foreshadow a turn in the financial tide.

The rediscounts of the Federal Reserve Bank are extremely low, as are the loans of ordinary banks. This banking condition, it is said, makes it reasonably certain that rising money rates are on no account to be feared for several months at least. In fact, a further decrease is possible.

Bonds Hold Firm

THE bond market remains steady, holding the gains which it made since 1920. The fact that it has not made further advances indicates, among other things, that investors are beginning to doubt whether bond prices will keep on rising, and are not as quick to buy as they were a few months ago. There seems to be some fear that because bonds have risen fifteen or twenty points they have hit the ceiling and cannot be expected to go any higher.

Roger W. Babson warns his followers against this feeling. "The fact is," he says, "that now is the time to hold bonds. Right now the average of twenty high-grade bonds is lower than during the most panicky days of 1907 or 1914. Four and one-half per cent long-term municipals, for example, may look high at 105, but I will venture a prediction that within the next two years these same issues will pass 115. A few days ago 20 high-grade railroad bonds sold on a 5% basis, the first time they have reached that level since early in 1917. The time will come,however, when we shall see these bonds selling on a 4% to 4.20% basis, as they did in 1905 and 1909.

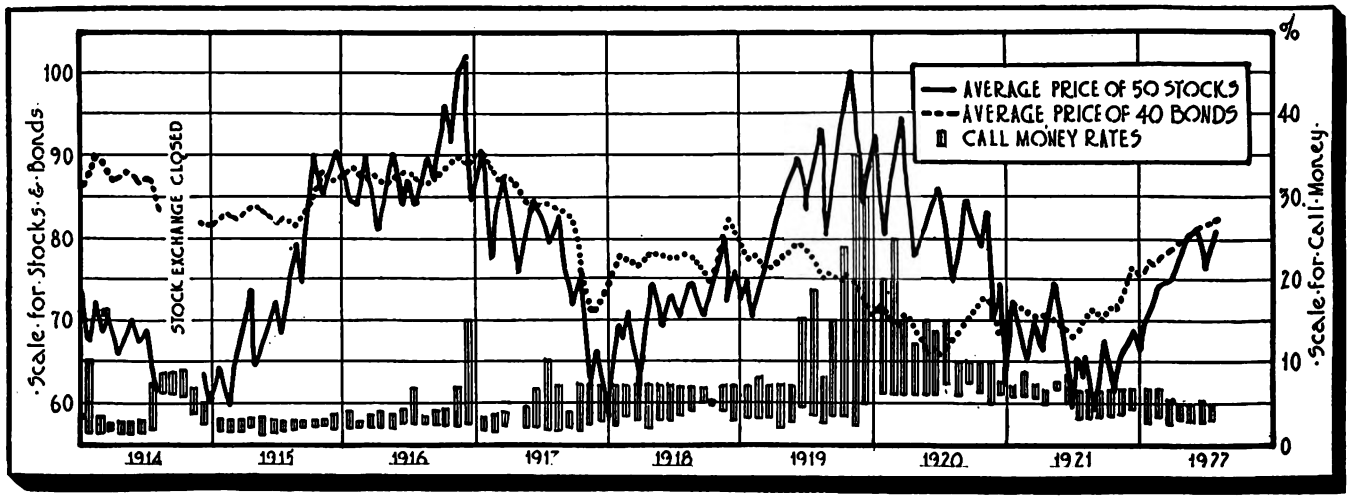
The failure of the bonds of the Jugoslav Republic to find a market in this country indicates that American investors are discriminating in their selection of foreign bonds. So the bankers who were selling the bonds have asked the Jugoslav Government to take over the unsold surplus.

This does not mean that a good foreign bond cannot be sold here. Older European issues are standing up very well, in spite of discouraging news from Germany and from the interallied conferences.

Equipment Securities in Demand

SECURITIES of the equipment companies—Westinghouse Brake, Pressed Steel Car, American Locomotive, Railway Steel Spring and similar concerns—offer excellent opportunities. Railway traffic will probably be heavy in the fall. Roads will have to speed up orders for new rolling stock.

Something like 500 new freight and switching engines have been placed in operation so far this year, but these will not be enough for the expected increase in business. Freight car orders have been large and are expected to be larger. Enough business will probably come to the car manufacturers to enable them to operate their plants at about 70% capacity.



Vital factors in security movements.—*(Magazine of Wall Street.)*

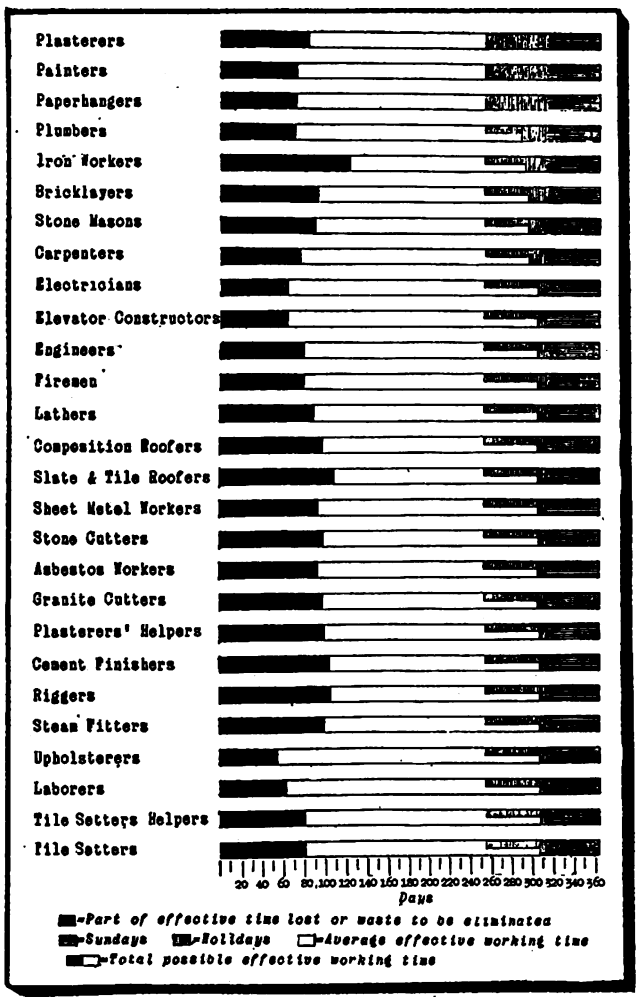


Shortage of Labor Increasing

ACCORDING to the National Industrial Conference Board total employment has declined 35.8% from June, 1920, the peak of industrial activity, up to January, 1922. Since August, 1921, there has been a slow and gradual increase in employment. The director of the Pennsylvania State Employment Bureau states that a shortage for skilled, semi-skilled and common labor exists throughout Pennsylvania. The shortage is said to be especially noticeable in farming and building operations. As a result wages have increased from 26 to 35 and 40 cents per hour. In many cases unemployed miners are helping to relieve the shortage.

Employees Lose Most Strikes

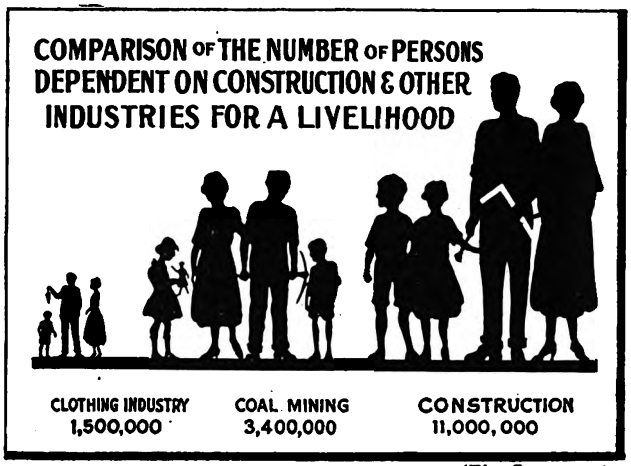
THAT a constantly increasing number of strikes are being lost by employees is indicated by compilation made from U. S. Labor Bureau sources. Out of every 100 strikes in 1916, the employers won 30, the employees won 31 and 39 were compromised. In 1920 the proportions were: 38 won by employers; 21 won by employees; 41 compromised. Figures for intervening years show a steady proportionate loss by employees from year to year. The cause of strikes in 1920 were: wages, 1511; wages and hours, 306; hours, 71; union matters, 849; miscellaneous and not reported, 372.



Comparison between effective working days per year and all other days in building trades.—*(The Contractor.)*

Progress in Textile Strike

ACCORDING to *Textile World,* there have been considerable gains in the number of looms operated at Lowell, Mass. Previous to the wage reduction of 20% the Merrimac



(The Contractor)

Company had been operating not more than 500 looms out of 4000. At the present time there are said to be 1500 looms working. The Lawrence Hosiery Company has also made a vertical wage reduction which averages about 20%. No labor difficulty is said to have attended this reduction. Although the mills at Lawrence have made slight gains, efforts to bring the strikers and employers in New Hampshire (especially in Manchester) together appear no nearer success than at the beginning of the strike.

Important A. F. of L. Decisions

POLITICIANS sometimes make strange bedfellows, but no stranger than those made by labor leaders. For example, at the recent American Federation of Labor convention, the Federation went on record as being in favor of the following legislation: It voted for—the admission of such immigrants only as are qualified for citizenship; Henry Ford's offer for Muscle Shoals; transfer cards from union to union; military standing for Russian railroad veterans; making the postal savings rate high; accounts payable anywhere and to survivors; investigation of parcel post rates; new trial for Sacco and Vanzetti; pension to Federal and postal employees; organization of janitors and elevator men; the strike of the textile workers; organization of clothing workers in women's wear in small towns; commending to all states Ohio's compensation law; printers' 44-hour week; organization of office workers and telephone operators; release of Tom Mooney and Warren Billings; support of the coal miners' in the present strike; promotion in Federal service by merit, temperament and seniority; reduction of night work for postal employees; support of workers' education and trade union schools; jurisdiction of flint glass workers in dispute with machinists.

The careful analyst will find it hard to reconcile favoritism for these measures with the antagonism shown for some of the following items which the Federation voted against: It was opposed to the ship subsidy bill; the law making motor boats for commercial boats less than 65 feet long exempt from pilots; trade with or recognition of Russia; state troops and constables; the Railroad Labor Board and the Cummins-Esch Act; laws like the Lusk laws, limiting freedom of teachers.



IN THE MANAGER'S OFFICE



Advanced Management Practice

AN analysis of the features of the Dennison Manufacturing Company's management is given by H. Feldman in *Industrial Management*. As this organization stands among the foremost in respect to advanced management practice, the principles set forth should prove of general application. Cyclical movements in the industry are anticipated and prepared for by concentrating on the efficiency of the sales force. During the business boom of 1920 salesmen were trained for the depression which was to follow and, in addition, new men were added to the force although they were not needed at that time. It was contended that the most logical time to train salesmen and give them self-confidence was during periods of greatest activity. Intensive sales analyses were undertaken to discover new outlets for goods and territories were divided.

As a support for the increased number of salesmen several new lines held in abeyance in boom times were released during the depression with the result that when production should have dropped off owing to the cycle, the new lines maintained and even increased the total output. A similar policy is followed with respect to advertising. The policy has been adopted that no one year can be considered in making important appropriations. In most businesses it has been the common practice to make the largest expenditures for publicity during periods of prosperity when advertising is the least needed and when it can be the least effective in the long run. The advertising policy of the Dennison Company is exactly the reverse. In good times the advertising is exceedingly moderate, just enough to retain the momentum, but in periods of business depression all forms of publicity are employed to the fullest degree, utilizing to good advantage the advertising appropriations which were neither needed nor spent during the time of prosperity.

A good application of the problem of cyclical changes to credit has been worked out. When there is a boom market, the company finds it necessary to let some business go because its plant would be oversold. It therefore rejects the orders of those whose credit record is the poorest. The remaining customers have a credit standing that is higher than the average, both in safety and promptness of payment. When the depression comes a little more credit is extended than otherwise might be warranted. More orders are received and by coupling the method with proper precautions, the ratio of losses has actually been reduced.

Thorough research is carried on in order that purchasing may be based on the best information available as to the nature of the markets involved. As the business cycle is predicted in every movement the attempt is made in each case to know not only what the changes in the prices of raw materials were, but what caused them. Since purchasing is at best a guess, the attempt is made to guess scientifically and to operate cautiously except when the indications are extremely clear. No speculation in raw materials is practised, the possibility of profits being outweighed by the risk of having to mark down inventories. For this reason, buying is from hand to mouth both at the peaks and at low depression points. Impending inventories receive attention at all times. When goods are ordered a long time in advance and in the meanwhile inventories on hand are not used because of a slump in demand, the situation may easily lead to an excess of raw materials that represents liability rather than asset.

In the analysis of commodity prices, rate of growth, etc., use is made of the "moving average" which is a surer guide to the real trend than the zig-zag movements of shorter periods. The rate of growth is definitely decided within certain general limits, and business above the maximum limit is refused. One reason for this is business caution—the desire to avoid inflation. Another reason is the desire to maintain the morale of the personnel. New employees cannot be added wholesale and the morale maintained. The ideal striven for is all-around, healthy development, and this could not be secured through sudden spurts.

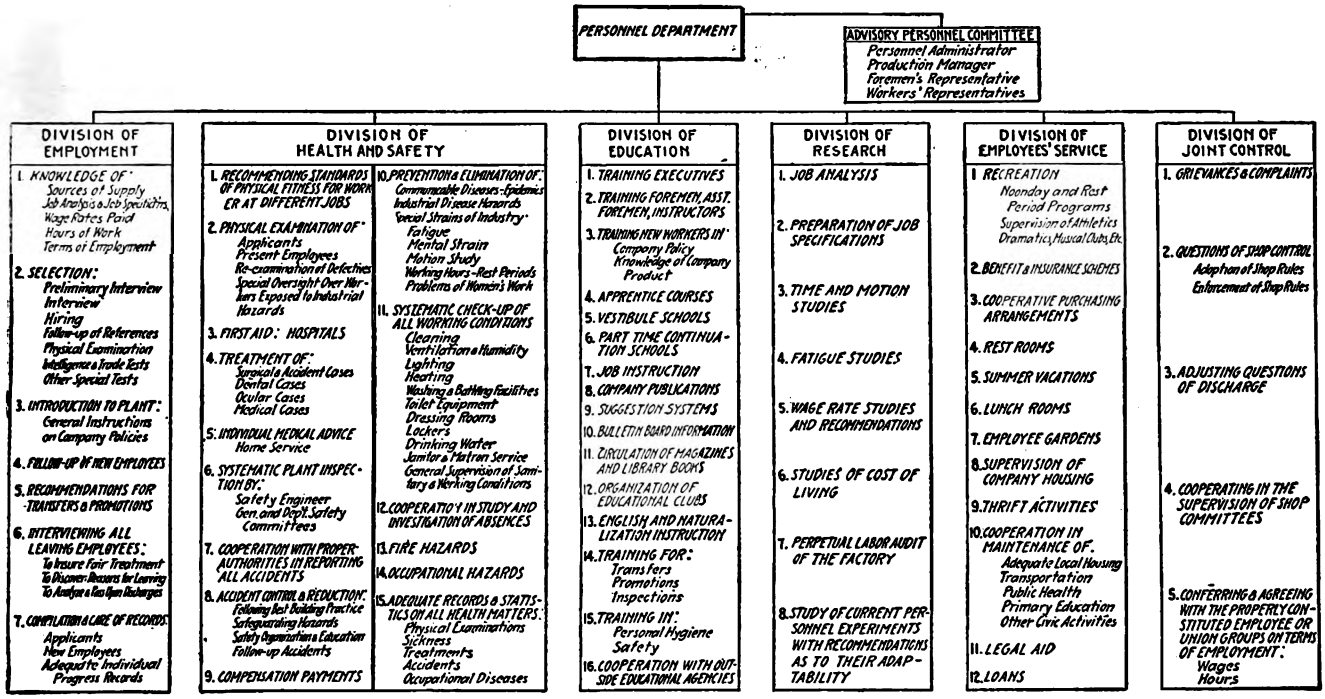
Nine Rules for Material Handling

NINE rules that apply to material handling problems and the selection of material handling equipment are given by W. T. Spivey in *Factory*. (1) Know every kind of equipment on the market. A haphazard selection of equipment which will do the job only reasonably well is a poor investment in the long run. (2) Analyze material routing carefully. The relation between the elements in a material handling system is, in many cases, more important than the design of the equipment itself. (3) Visualize the job's actual needs. No two plants have exactly the same problem. While the same principles apply in most cases, careful study of individual requirements pays well. (4) Buy for an operating saving, not for first cost. The man who buys on price alone doesn't always get what he thinks he does. Correct engineering analysis, a good machine, and subsequent service are worth a fair price. (5) Get together with the designer and the manufacturer. Doubtless there is much equipment manufactured which is not ordinarily known. How to select the best machine adopted to particular needs is a matter of engineering judgment gained through the experience of successful installations in other plants. (6) Lay out the equipment when the building is planned. A building is best planned with both eyes on economical manufacturing. Material conveying machines are the links which join other machines into unit production. (7) Re-arrange equipment systematically. A different product or a different operation sometimes requires an entirely different application of the machine. Many a "patch-work" job has been done without thoughtful planning. (8) Teach the operator the possibilities of his equipment. The science of material handling is a new one. Like the lathe, drill press, or milling machine operator, the man who runs the conveying machine will do a more effective job if he knows what it is all about. (9) Maintain conveyors as carefully as production machinery. Lift trucks, gravity conveyors, tiering machines, and so forth, are more than mere wheelbarrows. Each represents an investment and a heavy depreciation makes the investment a poor one.

An Accurate Cost-finding Method

SHARP declines in prices and the resultant keen competition have accentuated the importance of accurate cost estimates, especially in the case of the manufacturer of products made to order where each customer must be quoted an estimated price based on specifications submitted. The various specifications complicate the ordinary estimating routine, for while the manufacturer of standard products bases his prices on actual cost experience, the manufacturer of made-to-order products must base his prices on what he estimates they should be.

Functional Organization of a Manufacturing Plant—VIII Personnel



("Personnel Administration," Tead & Metcalfe; McGraw-Hill)

Functions of a Typical Industrial Plant

This chart is eighth in a series based to a large extent on lectures given at the Bureau of Personnel Administration.

Paul L. Dildine, in *Industrial Management,* outlines a method of estimating costs by a centralized control over (1) Labor, (2) Detailing in the drafting room, and (3) Purchasing of required materials. The cost item of overhead is omitted for the reason that it is a fixed charge which cannot be varied (except arbitrarily) for any specific job. The most difficult to control of the activities mentioned above is labor and the most accurate method of predetermining labor costs is by the use of time-study data.

The use of time-study data in estimating involves going into a great many details of the prospective job which in ordinary estimating are covered by blanket charges. The blanket method of charging is a hit-and-miss method, sometimes resulting in too high a price and just as frequently in too low a price. It has been found by actual experience that the use of detailed time-study data is more than justified in this period of close competition.

As an illustration of the method, the time required for punching tee and angle bars can be reduced to a few simple elements which are added together to determine the total time required for punching the number of pieces required. This total time multiplied by the number of workmen required gives the total labor hours for the operation. The average hourly wage rate paid is used in computing the labor cost. Since the actual wage rates do not vary much from the average, this method proves satisfactory.

If the prospective order is landed, the shop is required to turn out the job within the time limits set. This is where the detailed time set forth in the estimate sheet proves valuable. A blanket figure means nothing to the shop unless it is broken down into a definite number of hours for each operation.

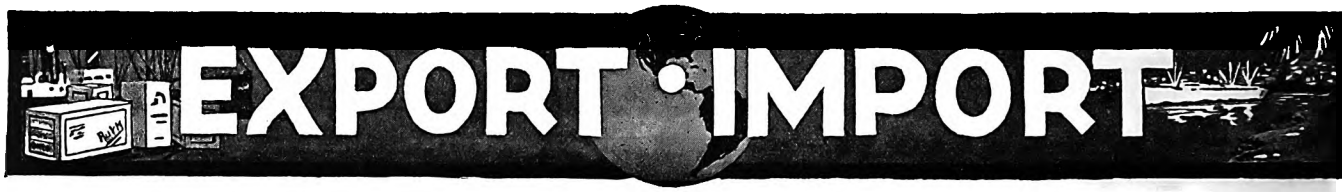
Another very important use for the detailed estimates is the determination by the planning department of the approximate labor required to complete the job within the promised time. The number of men to keep on the payroll can be determined with more exactness than is otherwise possible.

Applying Depreciation Rates

A METHOD for determining the true status of assets and the proper application of depreciation rates is described by Morgan G. Farrell in *System.* The first step in arriving at proper depreciations on any business property is to inventory all fixed assets at cost, or at fair value as of March 1, 1913, if acquired prior to that date. The ledger of a plant seldom shows all the fixed assets, though somewhere in the records—in voucher files, time sheets, freight and cartage accounts, contract file or supply and expense accounts—there is an entry accounting for every capital expenditure. From these records, the items of permanent investment may generally be separated and segregated.

After listing all items of equipment on equipment data sheets, and entering thereon the incidental expenses, the annual rate of depreciation is determined. Here a wide variation exists. Some manufacturers prefer to take the maximum allowable under the Federal Profits Tax law, 2% for masonry buildings, 3% for frame ones, 10% for some machinery, 5% for other kinds, and so on. Entries are transcribed directly from the equipment data sheets to a loose-leaf register of equipment. Major expense, such as replacement of important parts which lengthen the life beyond the original estimate, are entered under "repairs" on the equipment record, as reducing the depreciation reserve. The annual depreciation is also entered until the item reaches its predetermined residual value, after which no further entry is made until the item is scrapped, when its sales price is deducted from its residual value and the difference charged to the profit and loss account.

Some plan of numbering equipment which makes it possible to describe an item instantly and fully will be helpful. One method is to place on the identification tag a composite number including the number of the department, the serial number in the department and the class of machine. That is, 1-21-M indicates machine number twenty-one in department one. This principle saves time and expensive errors in posting records having to do with equipment.



Automobiles

THE favorable prospects for increasing foreign trade are encouraging automobile exporters to strengthen their export organizations in foreign countries. In addition to those manufacturers who have already established branches abroad there are also a number of newcomers entering the field. This trend is particularly noticeable among manufacturers of automotive parts, accessories and service equipment. With the increasing export activity, however, the shortcomings in foreign trade methods of automotive manufacturers become more apparent and it is reported that their unfavorable results threaten to impair American good-will abroad. Failures in export business are chiefly due to faulty approach to the foreign buyer. Foreign inquiries are said to be answered in a condescending tone. Solicitations of business often do not give sufficient information in regard to the standing, size and activities of the firm making the offer, and in many cases, prices are not quoted.

Cereals

AS a result of the drouth throughout many sections of Europe, a continued demand for both wheat and corn is expected. Since August 1, 1921, exports of wheat have totaled 6,853,000 bushels. Exports of corn since November 1 have been 198,140,000 bushels.

Chemicals

FOREIGN trade in drugs and chemicals is reported to be considerably above the pre-war volume. During the past few months there has been a remarkable increase in activity in the export of fertilizer materials to Europe. In May, 1921, our shipments were 54,518 long tons, valued at $927,221; in May of this year they rose to 158,148 tons, and were valued at $2,081,808. Shipments of ammonium sulphate are largely responsible for the great jump in value. In May we sold 11,945 long tons valued at $741,091. This was a notable advance over 3,634 tons ($271,339) for May, 1921. In spite of a large importation of foreign tanning materials, our exports of extracts in May showed an advance in value of 33% over the figure for 1921.

Glass

RECENT exports of glassware from the United States show an encouraging increase. The principal exports of glassware include table bottles, vials and jars, table ware, lamps and other glassware used for illuminating purposes. The chief purchasers are Belgium, Spain, Italy, the United Kingdom, China, Japan and South America. The total exports of glassware from the United States during May were valued at $359,890.

Lumber

A REVIVAL in the lumber trade in the Far East is predicted within the next few months. Westbound trans-Pacific liners are said to be well booked for the next two or three months. Lumber for export is continuing firm at $10 with a prospect of $12 for the last quarter of the year.

Leather

THE United States glove industry shows a favorable increase in the export trade of 1922, as compared with 1921. During the January-May period 73.4% as many leather gloves were exported as during the entire year of 1921. The five leading markets for 1922 are Canada, England, Cuba, Mexico and Norway.

Machinery

THE outlook for American machinery and machine tool sales appears to be improving, not only in Europe, but in the Far East. The danger of German competition is constantly growing less. In Belgium, for example, although not a great deal of machinery is being purchased at present, American machine tools are preferred, even at higher prices. An urgent demand for all kinds of agricultural machinery and implements is reported to exist in Turkey, and in that country American machinery and tools are said to have a fine reputation. The preference for American machinery in the various markets is said to be the result of excellence of design and workmanship.

Rubber

THE preference for American tires which appears to exist in many foreign markets is strikingly noticeable in Denmark. Exports of automobile tires from the United States to Denmark reached a total value of $279,370 in 1921, compared with $16,611 in 1913. Total exports of rubber manufactures to Denmark were valued at $433,310 during 1921 as compared with $75,338 in 1913.

Sugar

ALTHOUGH there has been a lull in the export demand for sugar, it is believed to be only temporary, since accumulated supplies in Europe will not be sufficient to last the winter. It is believed that in a comparatively short time European importers of refined sugars will again be buyers in the American market. Information from reliable European sources indicate that the greatest factor in cutting down the demand for American granulated sugar has been the fact that earlier heavy purchases have supplied immediate needs and European firms are now awaiting developments before placing further orders.

Textiles

IN spite of the handicaps to the sale of textiles, and particularly of cotton goods, in foreign markets, it is believed that export trade in cotton will continue to improve. The purchasing power of many countries has been much restricted as a result of the financial depression following the war, but in spite of this the volume of textile exports shows an encouraging growth. One of the reasons why American manufacturers have not been as successful as their European competitors is because they do not always produce the line of goods required abroad, but insist upon the export buyer taking what they choose to manufacture. In the case of both England and Japan the main idea in dealing with export markets is to give the buyer what he has been in the habit of purchasing.

A remarkable increase in the export of cotton hosiery occurred in the month of May, the official figures for which have just been published. They amounted to 508,793 dozen pairs, valued at $909,557, or an average value of $1.79, comparing with 416,706 dozen pairs, valued at $835,528, or an average of $2 per dozen in April. Not since December, 1920, have the monthly exports of cotton hosiery passed the half-million dozen pairs mark. The biggest customer in dozens in May was Cuba, with 120,799 dozens, valued at $148,485. The United Kingdom took 102,429 dozens valued at $204,056, Argentina 82,033 dozens valued at $201,018 and Canada 53,362 dozens valued at $88,454.



Advertising Business Booming

IT begins to look as if the optimists who have been prophesying an improvement in business will at last be able to enjoy a vacation. For prophesies are no longer needed to stimulate confidence. There are now concrete evidences of the upward trend in American business. From many industries whose degree of progress serves as a barometer of prosperity come encouraging reports, based on actual sales and production data.

Perhaps the volume of advertising in magazines and newspapers tells the story better than anything else. Newspaper advertising throughout the country shows a considerable gain over the business of last year, according to the comparative figures compiled for the 27 chief cities by the *New York Evening Post*.

This newspaper points out that lineage for the six months ending June 30 was about 2.1% ahead of advertising in the 119 leading daily newspapers in the 27 cities listed for the same period last year. The largest gains are shown by the papers in New York, Boston, Cleveland and Chicago. Of the cities listed, 19 show a gain and eight a loss, while 68 show gains and 51 losses. The total for the first six months of this year is 597,623,409 lines, a gain of 12,249,421 lines over the same period of 1921.

The six months total was better than for any similar period, except in 1920, behind which it ran about 3,000,000 lines or slightly less than 3%. The June lineage is also ahead of all except 1920 figures, which surpassed it by about 700,000 lines or 5%.

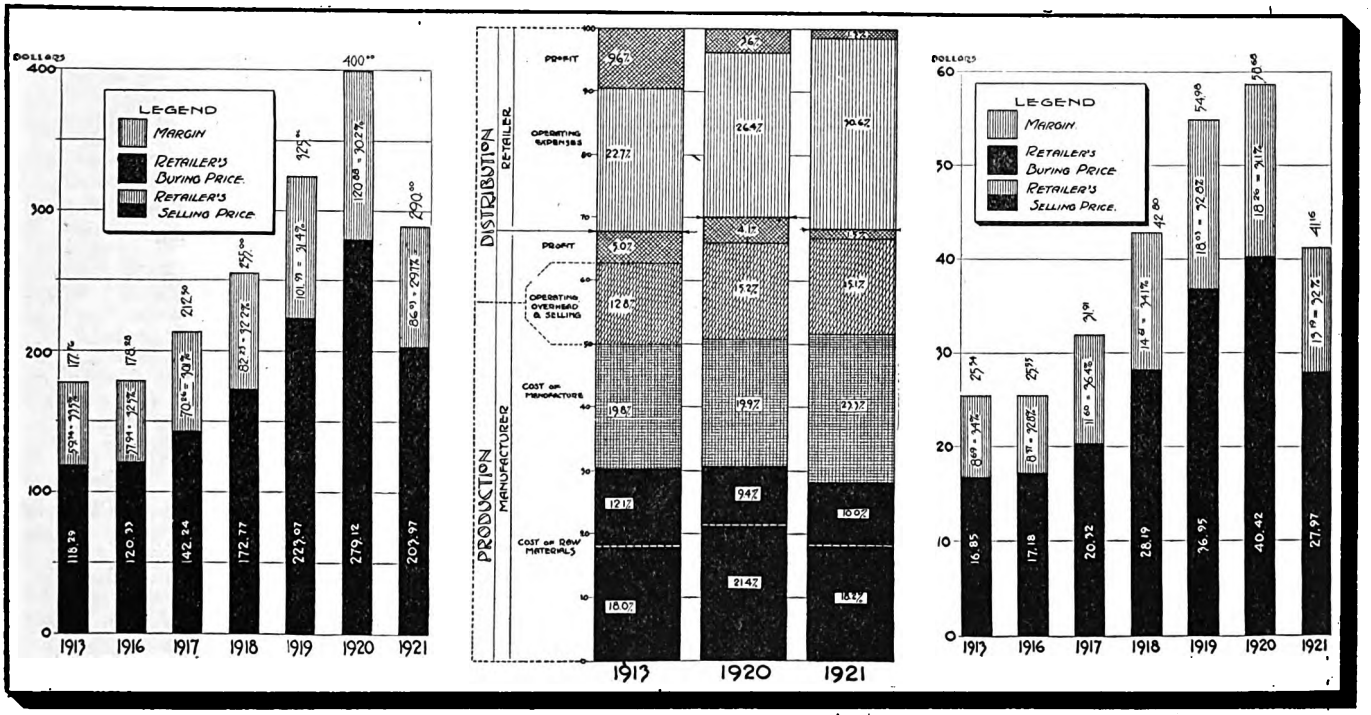
The advertising lineage that appeared in magazines for the first six months of 1922 is equally encouraging. The following figures compiled by *Printers' Ink* show the gradual increase in advertising in 61 leading national, class and women's publications in this country since the slump in 1921:

	1922	1921	1920
January	1,111,600	1,541,589	1,806,652
February	1,382,616	1,695,181	2,444,551
March	1,515,325	1,654,826	2,626,910
April	1,716,938	1,736,722	2,798,297
May	1,830,333	1,766,323	2,780,813
June	1,644,109	1,601,915	2,676,735
July	1,351,485	1,256,957	1,971,866

Although the lineage during January, February and March fell below that for the same months in 1921, in May there was not only a considerable gain over January and February of the current year, but a noticeable increase over the figures for May, 1921. This gain in advertising appears to have reflected the general industrial improvement. During May of this year, it will be remembered, increased production at the iron and steel plants, the prosperity in the automotive industry and the building boom had resulted in reduction in unemployment and improvement in general business. During June and July of this year there has been a slight falling off in advertising, but this is undoubtedly due to the usual slowing down of business during the summer months. Moreover, the totals for June and July compare favorably with the same months in 1920, and are in excess of those for June and July in 1921.

Advertising managers of leading trade papers report a steady increase in the number of contracts for space in their publications. The lineage for the first six months of the year has been considerably above that of the first half of 1921, and in July there has been, in many cases, an improvement over July of last year.

As might be expected the best gain has been in the automotive publications. The technical papers going to railway men have also shown a decided increase due, no doubt, to the enormous purchases which have been made in the railway equipment field.



How the dollar is distributed in the men's clothing industry: 1—Retail total of averages for 10 articles 1913-1921. 2—Detailed distribution of the consumer's dollar between the manufacturer and retailer. 3—Retail total of averages for 15 articles 1913-1921.— ***(Joint Commission of Agricultural Inquiry)***



A Two Million Car Market Every Year?

THAT a steady growth may be expected in the automobile industry is indicated by a recent estimate of the number of automobiles that will be needed annually. According to one of the leading manufacturers of automobiles, the average life of a car is from five to six years. Judging from the total of cars manufactured it is estimated that 1,500,000 will be replaced annually. And if to these are added 500,000 cars to cover additional requirements of old and new users it will mean that a total of 2,000,000 cars must be produced annually.

Another branch of the automotive industry in which production is likely to increase is that of farm tractors. A survey by the U. S. Department of Agriculture of 85 farms where tractors were used and 85 farms where tractors were not used shows that the cost of drawbar work on the farm where only tractors were used was $701 per year, compared with $1025 where the tractors and horses were used. There was an average of 10.5 head of workstock on the farms where horses and tractors were both used. One horse was needed for each 33 crop acres while the tractor owners kept one for each 42 acres and needed, in addition to their tractors, only one horse for each 54 crop acres.

Owners' opinions on the value of their investment showed 75% satisfied with their tractors and 72% who intend to buy others when needed.

This market for automobiles of course increases the possibilities of accessory sales. In a recent number the *Associated Business Paper News* gives an account of an automobile dealer whose sales of accessories in the first three months after adding them to his stock totaled over $2800. This publication also tells of a Ford dealer whose analysis of his sales for the first two months of 1922 furnished the following interesting figures:

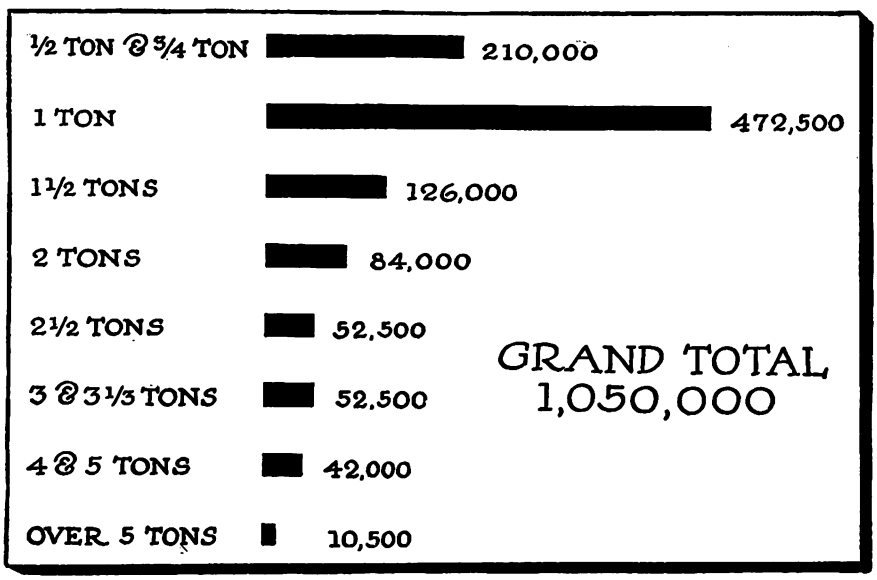
New cars and trucks	$1,751.50
Used cars and trucks	854.50
Ford car and truck parts	2,653.15
Accessories	3,698.28
Tires and Tubes	685.54
Gasoline	1,673.99
Oil and Grease	392.41
Storage	862.89
Labor	1,366.79

Types of Buses and Their Legal Limitations. City, intercity and country are given as the three logical divisions into one of which all motor bus services fall. These are described in some detail, as are the vehicles usually used in each. The statement is made that authorities generally favor three sizes for city work, for 21, 25 and 29 passengers. Some of the legal limitations are mentioned. R. E. PLIMPTON, *Power Wagon*, 7-22, 2500 w. MAH.

Planning Motor Bus Service. The assistant managing director of a large London motor bus company tells how to survey the field in which a motor bus service is planned, how to select and arrange the routes and runs which will prove profitable, and how to organize the service after the routes have been selected and settled upon. In addition many valuable operating hints are given. F. PICK, *Power Wagon*, 7-22, 6100 w. MAH.

A special twenty-ton truck is said to improve a gravel road, instead of injuring it. The load is distributed over six broad wheels, four of which are mounted in a line on the rear axle.—*Steam Shovel & Dredge Mag.*

During the first half of 1921 more than 2000 automobiles were imported into Uruguay.—*Tractor World.*



Total number of trucks in use in the U. S. by size, showing preponderance of light jobs. These form a large percentage of the 2,000,000 car market spoken of above.—*(Commercial Car Journal.)*

Diesel Type Automotive Engine Now in Production. This is an Austrian product, specially designed along parallel but not similar lines to the Diesel engine in an endeavor to overcome excessive compression and combustion pressures. Up to now these have prevented the use of this exceedingly economical engine for automotive vehicles, as great weight has been needed because of these factors. In this design, called the Hindlmeier, but generally shortened to Hindl, only part of the charge is compressed, and this is done in a small single cylinder air pump integral with the camshaft. No storage tank is used, the compressed air being used immediately. This is accomplished by timing the compressor so as to deliver the air to the cylinder at the moment the fuel is injected. Thus the fuel is both atomized and ignited by the air charge, and complete combustion results. With lowered compression, starting has been made less of a problem, and through the use of a compression release, hand starting is possible. The four-cylinder unit operates at 1150 r.p.m., which again is a departure from Diesel practice, as all marine and stationary power plant Diesels operate at low speeds, in the vicinity of 100 r.p.m. This much higher speed brings the engine into a speed range which will permit its use in trucks, tractors, gasoline railway cars, and other automotive units. *Automotive Industries*, 6-15-22, 1500 w. MAH.

War Department's Concrete Motorship Fleet. Brief details of the seven Diesel-engined concrete vessels owned and operated by U. S. Government and considered highly successful by the officials in charge. *Motorship*, 7-22, 1100 w. MAH.

Boiler-oils for Diesel Power. Author explains that terms boiler-fuel and fuel-oil are misleading. He gives technical descriptions of the oils to which these terms should be attached, and by means

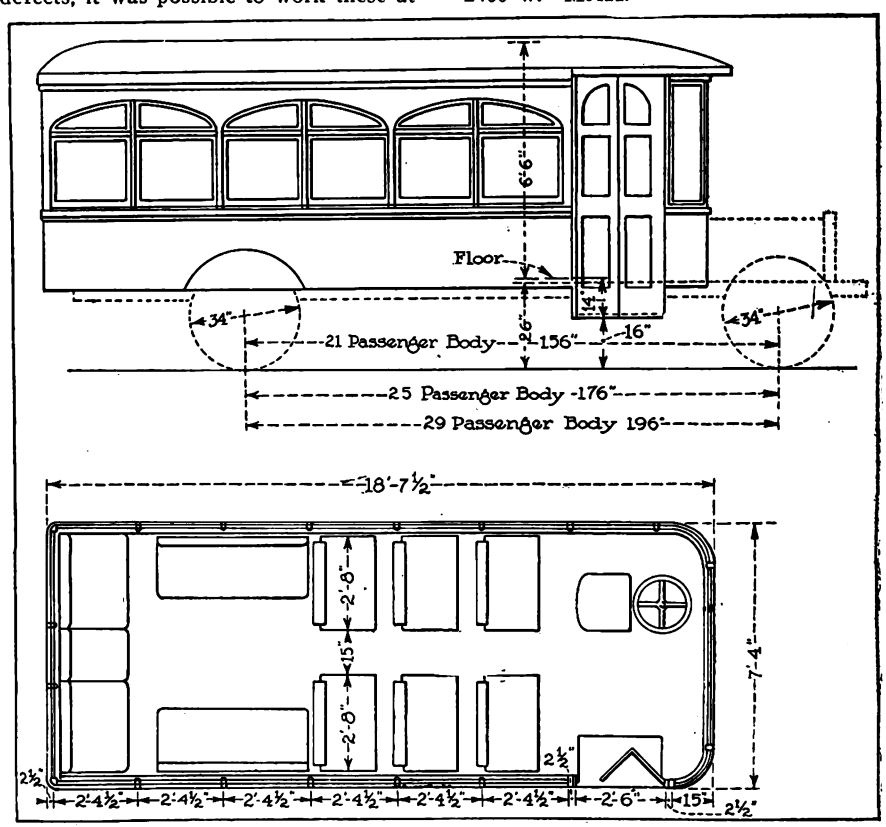
of charts shows about what should be expected from engines using them. Apparently a plea for the use of high viscosity oils in Diesel engines. B. Jackson, *Motorship*, 7-22, 3400 w. MAH.

Lubrication. "Oiliness" is that property of lubricants by virtue of which one fluid gives lower coefficients of friction than another fluid of same viscosity. Its importance under practical operating conditions is greater than is generally recognized. Variety of methods of measuring property of oiliness, five of which are discussed. It is believed that static friction test with proper refinements is best single measurement of this property but that it should be supplemented by measurements of the absorbed film at high pressures, in order to throw more light on the mechanism of the action of different constituents in lubricating oils. Animal and vegetable oils are almost invariably superior in oiliness to straight mineral oils. The blending of considerable proportions of these neutral glycerides with mineral oils greatly improves their oiliness, but the same result may be accomplished by adding much smaller proportions of other materials, such as fatty acids or oil-soluble soaps. The work confirms customary hypothesis that oiliness is due to selective absorption of constituents in oil by metal surface but common conception of mono-molecular absorbed film which acts merely by masking attractive forces of metal surfaces for one another appears to be incorrect. The absorbed film is shown to be of colloidal rather than molecular dimensions, is a plastic solid rather than a fluid film, and apparently acts by smoothing over surface irregularities carrying much of the load and minimizing metal to metal contact and abrasion. The structure and physical characteristics of this film seem to be more important than its thickness in determining its efficiency in lowering friction. The constituents of lubricants which form these absorbed layers may be selectively absorbed and largely removed from the oil by repeated treatments with very finely divided metals, such as iron by hydrogen. R. E. Wilson and D. P. Barnard, *J. Ind. Eng. Chem.*, 8-22, 12,000 w. CJW.

New American Marine Oil Engine. A new Pacific Coast design of engine particularly fitted to the service demanded there, the fuels available, and the general West Coast conditions. This design is of airless injection or solid-injection form, and in the 140 b. hp. size illustrated and described, has three cylinders 10¾ bore by 16 in. stroke. Cylinder compression is 359 lbs., and air compression 1,500 lbs. The features are well brought out in the article and illustrations. *Motorship*, 7-22, 1750 w. MAH.

Role of the Oven in Automotive Manufacturing. Ovens are widely used now in the production and quick finishing of many automotive parts. In this article, some of these parts are mentioned, and the oven treatment is outlined. Among others the Durant (Michigan) system of painting body parts is illustrated and described, with the ovens described in considerable detail. *Automotive Manufacturer*, 6-22, 3100 w. MAH.

Forged Aluminum for Aircraft. This refers to British experiments and research work, which was undertaken to find a strong alloy suitable for use in aircraft, yet such as to lend itself to rolling, drawing, extrusion and other working processes. The first alloy with which much work was done was known as alloy A, and consisted of 77% of aluminum, 20% zinc and 3% copper. Billets could not be rolled directly, but after a process had been worked out to produce sound ingots without surface defects, it was possible to work these at a high forging temperature and to produce 1¼ and 1⅝ in. rods with an intermediate and a final annealing. These rods after reheating to 400° C. could be worked down into smaller and commercial sizes and shapes. It was also possible to produce sheets with remarkable strength and other properties. Another composition, known as alloy E, had the same zinc contents, copper reduced by 0.5%, and these additional elements: Magnesium 0.5%, manganese 0.5%, iron not to exceed 0.2% and silicon not to exceed 0.2%. This was readily rolled into sheets and ⅞ in. rods. The latter had a yield point of 32.9 tons per sq. in. as compared with a primitive elastic limit of 22.1 tons, and a tensile strength of 37.8 tons. This is claimed to constitute a considerable advance in strength over any light alloy previously produced. After experimenting with the best methods of producing and working this metal, sheets were produced which exceeded even this figure, practically 40 tons per sq. in. being reached in hot rolled sheets quenched at 400° C. and aged. *Automotive Industries*, 6-8-22, 2400 w. MAH.



Standard Motor Bus Construction Proposed

The engineering committee of the American Electric Railway Association has drawn up tentative plans for standard motor bus construction, as indicated in the attached preferably of either poppet or sleeve valve type, with maximum speed not to exceed the National Automobile Chamber of Commerce, this development is felt to mark a definite effort on the part of street railways to enter the bus field. The proposed dimensions for the three sizes of chassis are:

Number of passengers	21	25	29
Wheelbase (inches)	156	176	196
Engine (horsepower)	30	40	50
Tread, front and rear (inches)	66	66	66
Capacity of rear (tons)	2	2½	3
Braking surface (sq. in.)	150	175	200
Approx. maximum weight (lb.)	4500	5000	5500

Other recommendations are: (a) Low-hung type of chassis frame with a maximum frame height of 26 inches, preferably lower. (b) Spring suspension. (c) Engine, preferably of either poppet or sleeve valve type, with maximum speed not to exceed 1300 r.p.m. (d) Gear ratio not to be less than 7 to 1, and not more than 12 to 1. (e) Metal plate or spoke wheels. (f) 34-inch solid or semi-solid tires; pneumatics where low floor height not desired.

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Better Distribution Methods Needed

IN the opinion of *American Contractor,* the present coal strike may result in more efficient distribution of building materials. From the rules laid down by the Government it appears that building materials are to be classed as non-essential and therefore must be held in the manufacturers' yards until the railroads are able to deliver them to the purchaser. It is pointed out that there are two ways of getting around this difficulty and that either will likely prove a benefit to the industry in the future. The first is to ship all materials by motor truck, especially for the shorter distances, and the second is to use water transportation whenever possible.

Steel and Portland cement will prove difficult to obtain except by truck or water transportation. Lumber may be shipped to many centers by water at very favorable rates, and the balance of the distance can be covered by trucks. Even though such methods may at first be somewhat expensive, it is believed ways will soon be found to bring the costs below even those prevailing on the railroads at the present time, and so, in the end, work out to the advantage of the construction industry.

Industrial Plants and Their Location. General survey of principal features to be considered in locating, designing and construction of industrial plant. First consideration is choice of district—points to be considered: proximity of raw materials, markets, power, labor, transportation. Next consideration is site, and points to be studied are: cost of land, railroad, labor, healthfulness, suitableness of topography, natural water supply, advertising value, public improvements, legal points, financial aid. Work and duties of industrial engineer in making final choice of site, planning, designing and constructing plant are given in detailed lists under heading: location and planning, detail work, construction. Another table gives points to observe in handling construction: schedules, bids and contracts, inspection, cost records. Illustrated with several flow sheets. F. THEO. GNAEDINGER, *Eng. J.* (Canada), 7-22, 7000 w. CS.

How to Make Forms for Concrete Buildings. Fifth article of series, dealing with flat slabs. WILLIAM F. LOCKHARDT, *Concrete,* 7-22, 1000 w. CS.

Guild System of Building Houses in Great Britain. Description of building trades union co-operative enterprise from start to present world-wide significance. Illustrated. JOHN Y. DUNLOP, *National Builder,* 7-1-22, 2000 w. CS.

Short Cuts in Building Estimating. First article of series on various methods rapid estimating. Covers: approximate estimating, unit costs, diagrams, square foot cost, practical application diagrams and basis principles. THEODORE F. LAIST, *National Builder,* 7-22, 2000 w. CS.

Building Material and Construction Costs. Part XI. Roofing. Covers: wood shingles, shakes, slate, clay tile, concrete tile, metal shingles—zinc, copper, steel; and roofing for promenade decks. THEODORE F. LAIST, *Construction Economics Edition, Am. Contr.,* 7-1-22, 2000 w. CS.

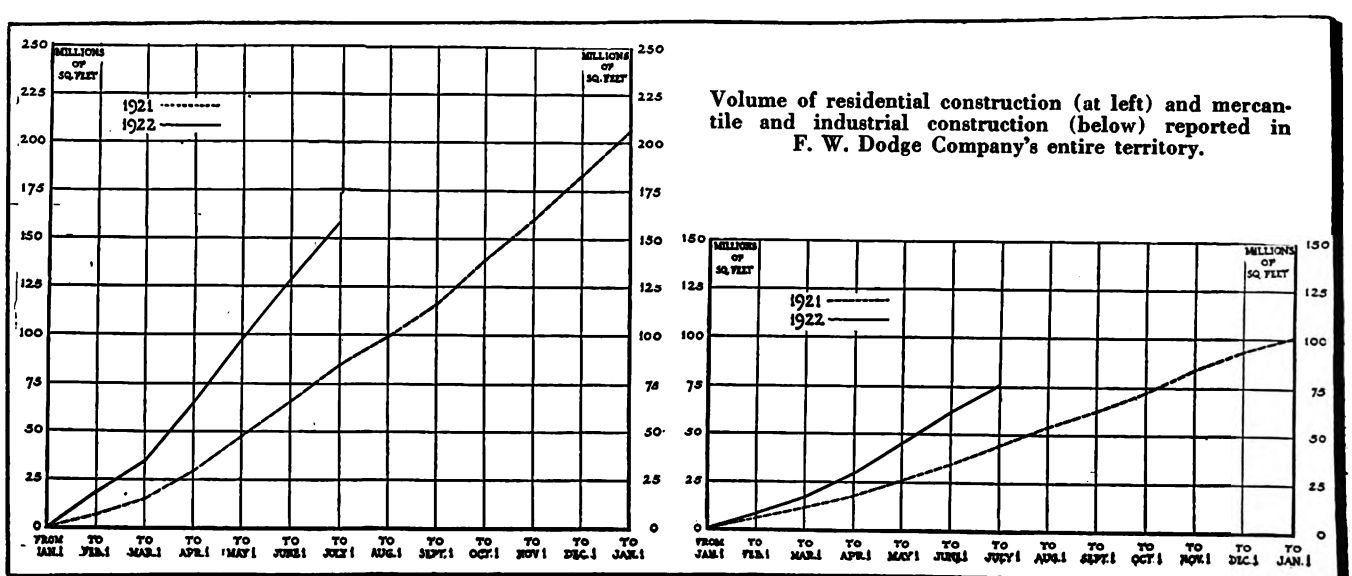
Cleaning Stone Buildings. Acid compounds, air-blasting or washing with wire brushes not recommended. Best method water, soft soap, ammonia and fine white sand, and scrub with stiff fibre brush. *Stone,* 7-22, 800 w. CS.

Co-operative Ownership of Apartment Buildings. First of three articles. Covers: methods of operation, development of project, and management of building. *Arch. Forum,* 7-22, 3000 w. CS.

The Skyscraper. Interesting story of first skyscraper down to latest design, with suggestions for future. F. W. FITZPATRICK, *Architect & Engineer,* 5-22, 3500 w. CS.

Removal of Three First-Story Columns in Twenty-seven-Story Building. In construction of addition to American Telephone and Telegraph building in New York City, some extremely heavy column loads had to be transferred to new columns to obtain desired space arrangement. Three columns carrying side wall and end floor bays for full height of 27 stories were relieved of loads at third floor level, the 24-story upper sections carried by cantilever trusses in new building, lower sections removed. This scheme permitted very gradual transfer of load, allowed full use of existing building and required minimum falsework. Detailed plans and methods given. EDWARD F. WEISKOPF, *Eng. News-Record,* 7-6-22, 3000 w. CS.

Continuous-Mat Foundations for 22-Story Building. Description of Standard Oil building in San Francisco founded on inverted floor 3-ft. thick, reinforced by ribs between columns. Concrete piles used along property lines. *Eng. News-Record,* 7-13-22, 800 w. CS.



Volume of residential construction (at left) and mercantile and industrial construction (below) reported in F. W. Dodge Company's entire territory.

Method and Organization in Construction Plans. Bigger the job the bigger the profits from forethought and planning, but no job too small for systematic handling. Gives several suggestions. *National Builder,* 7-1-22, 600 w. CS.

Building houses of cinders is the latest in concrete work. Cinder bricks of a large size are made on the spot from a mixture of coal cinders, cement and a special chemical binder. The bricks when first laid are still soft enough to allow the nailing of plaster laths directly to the inside surface.—*Steam Shovel and Dredge Mag.*

Recommended Practice for Concrete House Construction. Progress report of Committee S-5, American Concrete Institute. Covers: basement and foundation walls, superstructure walls, floors, roof, materials, design, construction. *Concrete Products,* 6-2, 2000 w. CS.

Concrete Construction. Second article of series, deals with mixing and placing of concrete in detail. WALTER W. CLIFFORD, *Arch. Forum,* 7-22, 3000 w. CS.

Accidents occurring on Mondays in bridge and structural iron work decreased from 24% in 1919, before prohibition went into effect, to 19% in 1920, under prohibition, according to an industrial accident report just issued by the Bridge & Structural Iron Workers' Union, of Chicago.—*American Lumberman.*

Effect of Initial Pavement Design on Ultimate Costs. Covers inter-relationship of brick, concrete and asphalt in modern highways, giving examples and tables showing first costs, ultimate costs, and life in years of various type highway construction. WALTER E. ROSENGARTEN, *Highway Engineer & Contractor,* 7-22, 2000 w. CS.

If an intense heat from a burning building strikes a beam bearing a full load in a building, does a wooden beam last longer than steel? The Bureau of Standards has discovered that where structural steel heated and buckled in 10 min. the wood lasted 25. The best beam for resisting heat was found to be the concrete beam.—*Steam Shovel & Dredge Mag.*

Exploratory Boring in Public Works. Engineers planning large works should know nature and quality of underground mass supporting heavy structures, information upon which design, cost and very existence depend. Article covers methods of subsurface surveys and machines; methods and results for Catskill aqueduct pressure tunnel; Devasego dam site; Hudson River borings; earth and rock boring inspection, and records. JAMES F. SANBORN, *Eng. News-Record,* 6-22-22, 6000 w. CS.

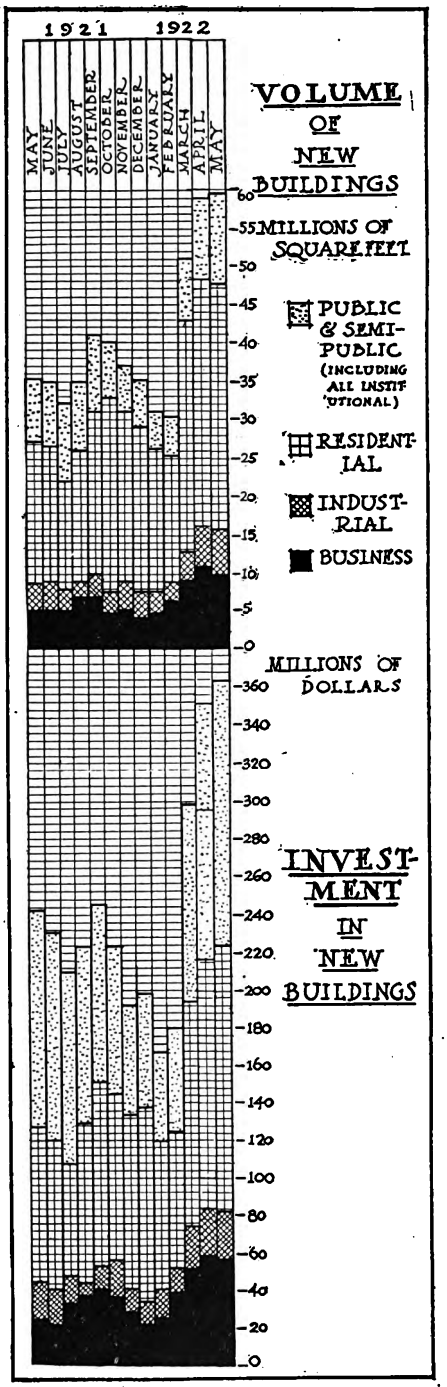
How to Make Room for Concrete Buildings. Fifth article covers flat slabs. Practical article, illustrated. WILLIAM F. LOCKHARDT, *Concrete,* 6-22, 4000 w. CS.

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Pressed Steel Joist Construction. Steel joists made of pressed steel, cold formed into channels and angles, and assembled into sections having shape similar to structural I-beam. Covers uses and methods of construction. J. J. CALVIN, *Eng. World,* 7-22, 1000 w. CS.

Fire Resistance of Concrete Building Units. Is concrete block a satisfactory unit for construction of first-class buildings? This question will soon be answered by tests being arranged by Underwriters' Laboratories. Description of tests agreed upon are given. *Eng. World,* 3-22, 2600 w. CS.



Volume of new buildings in millions of square feet and investment in new buildings in millions of dollars, for the year ending May 31, 1922.—*(Architectural Forum.)*

Construction Joints in Concrete Pavements. Illustrated descriptive article on eight special joints in Pittsburg (Cal.) test road show means of strengthening slab where breaks usually occur. *Eng. News-Record,* 6-29-22, 1000 w. CS.

Concrete Basements and Foundations. Fourth and last article dealing with concrete basements and foundations. Covers: concrete block setting, setting door and window frames, cellar steps, piers. *Permanent Builder,* 6-22, 800 w. CS.

Fire Resistance of Building Columns. Covers: ultimate and useful resistance, effect of column length, load carried by covering, concrete covering, comparison of different materials, tests of small specimens. S. H. INGBERG, *Eng. News-Record,* 6-29-22, 3000 w. CS.

Ventilating Equipment for a Music Hall. Description of equipment of Kilbourn hall, Rochester, N. Y.: Use individual floor supply of washed, tempered and humidified air in volume of 35 cu. ft. per minute per person. Air is delivered mainly through mushroom ventilators under each seat and exhausted through aspirating chambers near roof. *Heating & Ventilating Mag.,* 6-22, 800 w. CS.

Finishing Interior Wood Trim. Three popular methods of interior finishing: stained and varnished, stained and waxed finish and enamel finish. First two used any wood, enamel mostly on close-grained woods. Covers: acid and spirit stains, filling, shellac, varnishing, dull and gloss finishing, effects of temperature on varnish. *Bldgs. & Bldg. Management,* 6-26-22, 1000 w. CS.

Pneumatic Placing of Concrete. Description of methods and machines used in lining the Coulter railroad tunnel near Pittsburgh with concrete. No interruption to traffic. Compressed air used, found particularly adapted for use in inaccessible places. SIDNEY MORNINGTON, *Compressed Air Magazine,* 7-22, 2000 w. CS.

Expansion and Contraction of Concrete Due to Moisture. Results of experiments at University of Illinois. Aside from action of direct load, deformations are produced in concrete by changes in temperature and in moisture content. Covers description of methods, results and conclusions. *Eng. World,* 7-22, 800 w. CS.

Early History of Pipe Covering. Article by two veterans of pipe covering industry giving their early recollections of trade. Col. Thomas M. Valleau states that steam pipes were first covered in 1858, and gives his experience with early coverings and their history. Henry F. Grier starts with Chalmers-Spence cement mixture in 1869, and gives his experiences. *Asbestos,* 7-22, 100 w. CS.

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Creating New Markets for Stone

OFTEN a potential market for stone exists which may easily be developed into an actual market, points out *Rock Products.* As an example of this there is cited the case of a city of about 175,000 inhabitants where a new filter for sewage disposal is being constructed. Since 300,000 yards of stone are to be used in the new construction, the city decided after careful investigation to build its own crushing plant to furnish the stone.

It is pointed out that this type of disposal plant and filter is suited to many communities and that it may be possible to convince authorities in other communities of this need. It must be remembered that few communities are so situated that they would construct their own crushing plants. The chief object is to place the stone on the filter with as low a total cost as possible, and in nine cases out of ten this means stone supplied by a commercial producer.

Oxychloride Stucco. Calcium chloride can be substituted for magnesium chloride only under special conditions. The solutions must be much more dilute and less filler can be used. Mixtures of the two chlorides do not give as good cement as either separately. Some good cements were made with dolomite-calcium chloride and better ones with dolomite-magnesium chloride. The latter compare favorably with commercial stucco material on market. J. B. SHAW and G. A. BOLE, *J. Am. Ceramic Soc.,* 6-22, 3500 w. CJW.

Induction and Synchronous Motors in Cement Mills. Some direct current motors used in cement mills, but majority alternating current induction motors. With exception kiln and tube mill, starting conditions not severe and squirrel-cage induction motors recommended. In kiln, speed variation makes it necessary to use slip-ring motors. Tube mill requires 120% to 130% normal torque in starting, and although squirrel-cage induction motors used extensively up to 200 hp., practice to use high-voltage compensator tap or through direct on line with full voltage. Practice not injurious to motors, but objectionable where power plant capacity is limited, or chain-drive used. Also tendency to crystallize driving shaft on tube mill. In mill using up to 500 hp., necessary to use slip-ring motors. H. W. ROGERS, *Cement, Mill & Quarry,* 6-20-22, 750 w. CS.

Concrete Lumber Industry Is Growing. Manufacture of concrete lumber has been established by several concerns, and general acceptance of product as building material seems assured. Article covers its various uses. W. A. SCOTT, *Concrete Products,* 6-22, 1500 w. CS.

Tests on Molding of Concrete Under Pressure. Results of tests to determine effect of pressure in molding and various curing methods upon characteristics of concrete, particularly as regards strength, density, absorption and ease of manufacture. HUGH M. NELSON, *Eng. News-Record,* 7-6-22, 1800 w. CS.

Effect of Alkali Upon Concrete. Alkali causes decomposition. No method known of preventing such deterioration, but impermeability retards it. Gives recommendations as to aggregate, proportioning and placing of concrete. S. H. MCCROY, *Cement & Eng. News,* 6-22, 1500 w. CS.

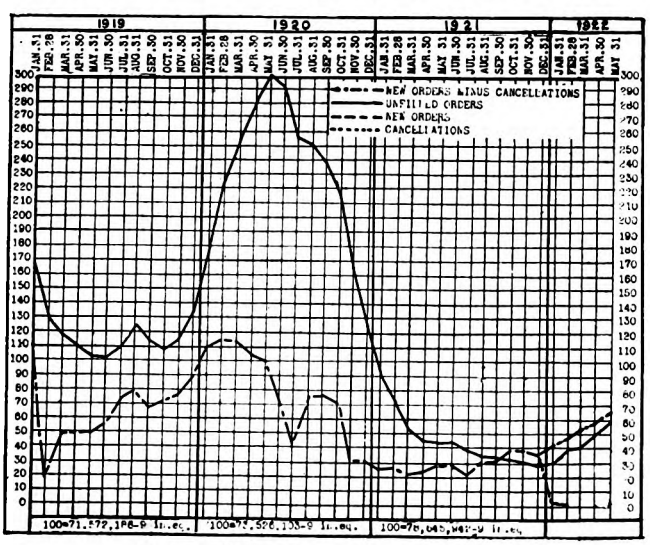
Pacific Coast Magnesites. California and Washington have sufficient reserves of this important non-metallic mineral of proper quality to supply our industries for centuries. Article covers: occurrences, development of industry, present conditions, mining methods and uses. W. P. BARTLETT, *Rock Products,* 6-17-22, 2500 w. CS.

Characteristics of Concrete Brick Masonry. Results of tests at Columbia University to obtain data on relation between physical properties of wet mixed concrete brick and properties of concrete brick masonry as means of judging consistency present specifications applied to concrete brick and furnish foundation for future specifications. Methods, results, graphs, photos given. HERBERT A. DAVIS, *Concrete,* 7-22, 1600 w. CS.

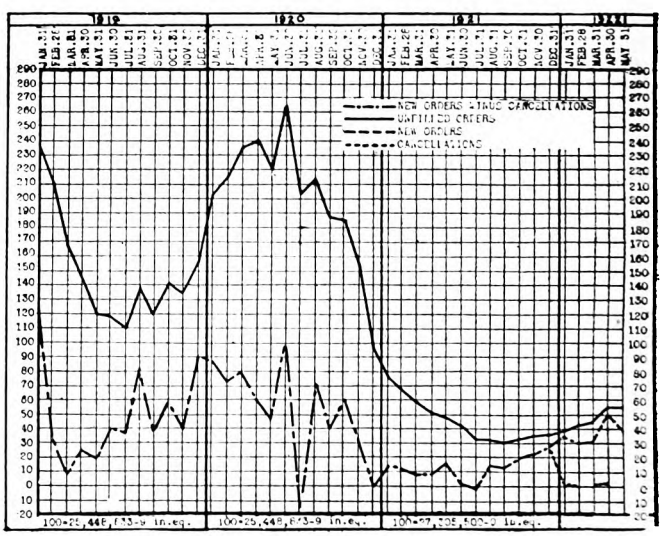
Way to Use Stone Screenings. Description of plant successfully making brick from cement and quarry screenings at prices to compete with clay brick. *Rock Products,* 7-15-22, 500 w. CS.

Removal of Clay from Sand and Rock. Concluding article of series, covering production more than one size, classification by wet process, scrubbers and disintegrators, washing of fines, equipment. Says: "Washed sand is a manufactures product." EDMUND SHAW, *Rock Products,* 7-1-22, 1000 w. CS.

Best Practices in Use of Explosives. Importance of explosives to clay industry have been underestimated. Gives methods of use, care and economy for clay products plants, explaining properties of materials in use. *Brick & Clay Record,* 6-27-22, 2500 w. CS.

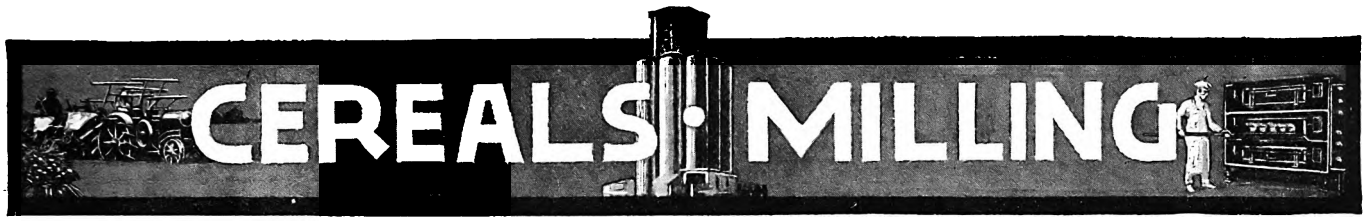


Potential Supply of Fire Clay Brick



Potential Demand for Fire Clay Brick

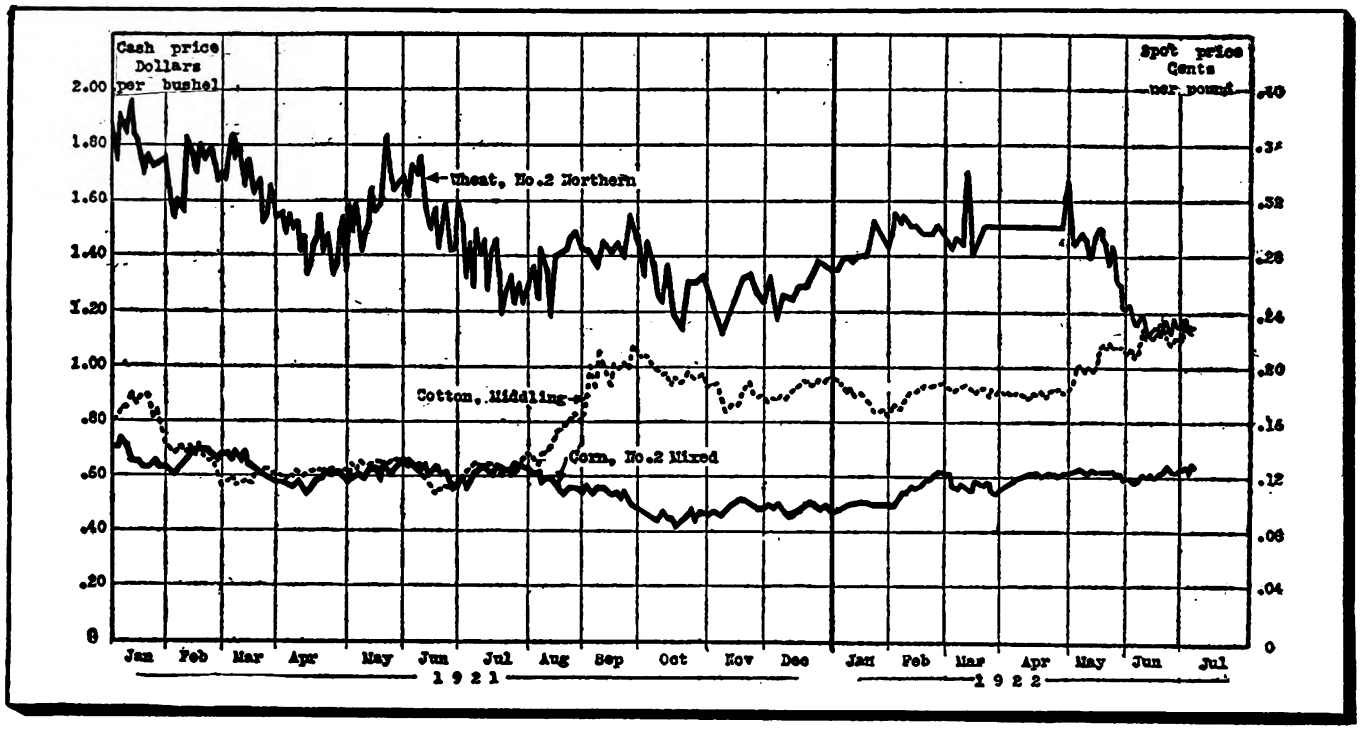
With the potential markets referred to on top of page developed, the potential supply here shown will be drawn upon for greater actual demand. The figures on the side of the charts stand for monthly economical producing capacity. Charts made by the Refractories Manufacturers' Association.—*(Brick & Clay Record.)*



Wheat and Corn Needed in Europe

RECENT estimates of the wheat crop in Europe indicate that it will be smaller than last year and consequently imports of wheat from the United States are certain to be increased. In Germany, southern Italy, Austria, Czecho-Slovakia and Hungary there has been insufficient rainfall to meet most agricultural needs.

According to official estimates the wheat yield in France this season will show a decline of from 15% to 20% from the yield of last year, which means that in order to meet the country's requirements, France will be obliged to import at least 1,000,000 tons of wheat. In view of the prospects for a poor harvest, the German Government is already contemplating measures for food provisioning and it is reported that 2,000,000 metric tons of bread grain will be needed this winter. There is also likely to be a considerable demand in European countries for corn.



Wheat Declines as Cotton Goes Up

Since last May wheat and cotton prices have been moving in opposite directions, while the price of corn has remained steady. The slump in wheat prices has thrown that commodity again badly out of line, while the sharp advance in cotton has placed the price of that staple far above the general average for farm products. In May, 1921, among the various groups of agricultural producers, cotton growers were suffering most from deflation and wheat growers least. The rise in cotton is due to the reduction of the heavy carry-over that depressed prices throughout the first half of 1921, to better demand, and to the prospects of only a moderate yield from the coming crop. The wheat market, however, has been dominated by bearish influences since April, and was not materially strengthened by the recent Government estimate of a total yield of 817,000,000 bushels of spring and winter wheat in 1922. This is 18,000,000 bushels short of last year's harvest, but the European demand is expected to be less active this fall than a year ago.—*(New York Evening Post.)*

Soft Wheat Milling. Too much stress cannot be placed on selecting good milling wheat. Should be graded according to quality, test and moisture. Scouring should be done after tempering. Scour in such way as to remove very little of bran and as much as possible of fiber, beard and stem. Tempering best done by means of water and steam. Water may be used alone but not steam. Purifying plays an important part in mill. Stock should be as pure as possible before it goes to rolls. Must have good head miller. J. J. SCHEURICH, *Millers' Review,* 6-22, 1500 w. CJW.

Insect Control in Flour Mills. Cleanliness first essential. Most practical and effective method known to control all classes of mill infesting insects is in application of high temperatures. Temperature of 118 to 125° F in all parts of mill sufficient to kill all stages of every insect. Steam most satisfactory heat for this purpose Hydrocyanic acid, which is discussed, not satisfactory as heat. GEORGE A. DEAN, *Modern Miller,* 7-10-22, 1500 w. CJW.

Ash in Wheat. Official method for determining this value. Its use is in checking operation of mill from day to day. Ash uniformity is one of essentials of uniform flour and is also useful in judging good clean flour. Every change in milling mixture or in mill is likely to be shown in percentage of ash. Baker makes use of ash as indication of grade of flour. S. J. LAWELLEN, *Modern Miller,* 6-10-22, 1000 w. CJW.

Milling Chemist. Two important problems in connection with baking industry are flour and its study and fermentation. These two are discussed and will repay reading. E. B. CLARKE, *Bakers Weekly,* 7-8-22, 2000 w. CJE.

Doctoring Flour. British bakers have lost confidence in millers. Millers secretly add "improvers" to their flour, probably acid in character, saying that they increase yield of bread. Discussion of general situation. Practice does not exist in U. S. or Canada. *Northwestern Miller,* 7-28-22, 1000 w. CJW.

Bread-Making Chemistry. Series of articles which propose to outline description of science of chemistry in so far as it is of interest to bakers. Divided into fixed facts and open questions. First part covers chemical elements. ARNOLD WAHL, *Bakers' Helper,* 6-15-22, 1500 w. CJW.



Prospects for Drug Industry Encouraging

IN the opinion of *Drug and Chemical Markets* the outlook at present for the drug industries is the brightest that it has been in the last two years. A more stable condition is developing as the result of improved demand and the elimination of excess stocks.

Imported chemicals, especially from Germany, are not being sold here to the extent of a year ago. German war stocks are apparently exhausted and the prices on current products have materially stiffened. Rising exchange has also brought about higher quotations from England, France, Holland, Italy and Switzerland. And as prices advance a preference for American made chemicals is evidenced by buyers in this country, since many of the chemicals now manufactured in Europe are not up to pre-war quality.

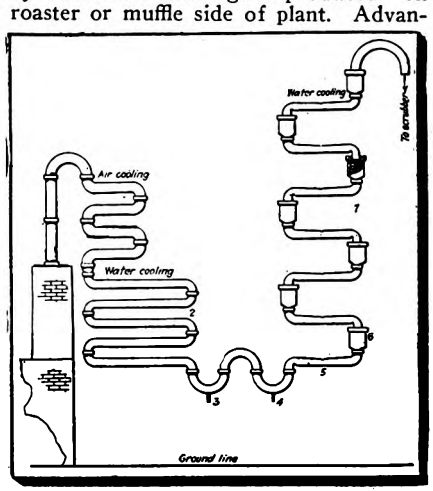
It is pointed out, however, that competition between American chemical makers constitutes a menace to the domestic industry. Price schedules have been broken by rebates, by delayed price advances to certain customers and by "sales through the backdoor." Not only have conditions been demoralized in the fine chemical markets, but also in the field of heavy chemicals, the basic materials of all industries.

Taking 20 representative items in each of the three groups—chemicals, drugs and oils—an average of their prices in their original packages shows that the peak was reached about two years ago, April-May, and that the low point came in August, 1921. Since that time crude drugs as a group have advanced nearly 20% and every indication points to still higher prices. The basic position of the essential oils is similar to that of the crude drugs. Depleted stocks and reduced production indicate that any slight increase in demand will result in higher prices.

Calcium Arsenate. Two recent improvements in manufacture are in acid production and reducing wet batch of arsenate to dry powder. Introduction of high silica iron for large nitrating kettles has made possible introduction of mechanical feeding of arsenic, mechanical stirring of the batch and dropping finished acid with sludge from bottom of kettle to shallow tank where sludge settles and acid is pumped to storage or insecticide units. Specially designed drum driers have been substituted for filter presses and hot stoves, oven or tunnel driers of old fashioned pigment plants. The liquor is simply pumped to drier, where it is picked up from trough on surface of hot cylinder and water is evaporated by time it reaches scraping knife. No more expensive than by removing part of water in presses. Quality of both products was improved and total cost considerably reduced. H. W. AMBRUSTER, *Chem. Met. Eng.*, 7-26-22, 1200 w. CJW.

Concentrating Nitric Acid. Study of distillation of dilute nitric acid solutions shows that very little acid is lost in distillate until concentration of boiling solution reached 20%. Rate of loss increases slowly until about 30%, when rate becomes much greater but still remains regular until about 55%, when it again begins to increase more rapidly. At 63% to 64% there seems to be a striking change and concentration of the vapor approaches that of the residue very rapidly. From data reported it is simple matter to calculate number of fractionations required to recover nitric acid from dilute solutions at a higher concentration. C. D. CARPENTER and J. BABOR, *Chem. Met. Eng.*, 7-19-22, 1600 w. CJW.

Hydrochloric Acid Plant. Vessel has broadened body, which is flattened so as to give large surface with relatively small volume. Dam or weir at one end of lower surface retains certain quantity of liquid in bottom of vessel, thus making this small reservoir. For low concentration of gas packed tower is placed between two absorption vessels. Absorbent is thoroughly cooled in its travel through intermediate absorption vessels. Cut is shown to illustrate general design of cooling and absorption system for hydrochloric acid gas produced on roaster or muffle side of plant. Advantages are light weight, economy of floor space, complete agitation of absorbent, liquid curtain through which gas must pass, no joints below liquid level, no glass tube connections or rubber joints, thorough cooling of gas and liquid, complete distribution of cooling water over large cooling surface. Other uses are suggested. S. L. TYLER, *Chem. Met. Eng.*, 8-2-22, 1600 w. CJW.



Absorption system for roaster side of hydrochloric acid plant. See "Hydrochloric Acid Plant" digest.

Chilean Nitrate Industry. Deposits estimated to be about 230,000,000 tons, or sufficient for 100 years. Production involves great accuracy, skill and experience as well as variety of complicated machinery. Other difficulties are fuel and water. Discussion of propaganda work. M. H. PAINE, *Commercial Fertilizer*, 7-22, 3000 w. CJW.

Nitrate beds, 11 feet below the surface and containing from 20 to 40% of nitrate, have been discovered in Chile—*Steam Shovel & Dredge Mag.*

Separations of Coal-Tar Cresols. Preliminary separation of 50%-60% m-cresol product may be obtained by comparative difference in rates of sulfonation of two cresols at low temperature. Most favorable conditions are preferential sulfonation at 40°C with 96% sulfuric acid for 6 hrs. The extracted aqueous sulfonic acid liquor yields an approximately 80% m-cresol product. 98%-100% m-cresol is obtained by conversion of the extracted acids into their ammonium salts and crystallization of the latter. 88%-90% p-cresol is obtained by second preferential sulfonation of the above extracted nonsulfonated cresols and recovery and purification of the residual nonsulfonated p-cresol product. A. F. CAMPBELL, *J. Ind. Eng. Chem.*, 8-22, 6000 w. CJW.

Distribution of Tar Recovery. Study of tar recovery from byproduct coke-oven gas at Wisconsin Steel Works showed that over 90% of tar present in gas is removed during its passage through mains and primary coolers. Two per cent of remaining tar is removed by passage through the exhauster, leaving only a little over 7% to be removed by tar extractor. Tars collected in mains contain large percentage of free carbon and residue due to mechanically carried coal dust. As separation temperature is lowered tars become lighter and more fluid. In the P. and A. tar extractor temperature and pressure cease to play an important part, for mechanical action of impingement of gas on a surface caused the separation. F. M. WASHBURN and G. E. MUNS, *Chem. Met. Eng.*, 7-19-22, 750 w. CJW.

Market for Tars. Low-temperature coal tars yield pitch, melting 80°C., suitable for briquetting, roofing and other industrial applications. Phenols compose nearly half of distillation product. The tar-oils may be used in timber preservation and have been used as fuel in Germany. Small part of product may be used in manufacture of artificial plastics. Most promising field for hydrocarbon mixture seems to be that of liquid fuel. Oil is less volatile than de-

sired for fuel and presents problems in refining, but these may be overcome if need of fuel is sufficiently great. Fraction boiling above 300°C. should have marked lubricating properties. Lower fractions may possibly be polymerized into lubricants. R. P. SOULE, *Chem. Age*, 6-22, 1600 w. CJW.

Phosphoric Acid. In preparation of pure prosphoric acid for food and chemical purposes, little question that furnace process is superior to sulfuric acid method. In manufacture for agricultural purposes, furnace process is not sufficiently far advanced to be factor, but time is not far distant when it will at least prove valuable adjunct to older and more generally employed method. Use of concentrated phosphates will come about very gradually for American farmer is accustomed to relatively low grade materials and acid phosphate has, up to present, satisfied his requirements. In manufacturing processes where cheap reagent is required only for its acid or dehydrating properties, it would be poor economy to use phosphoric instead of sulfuric acid. Where use of phosphoric acid actually adds market value to product, as it does in case of fertilizer, it is logical to employ it, and also highly desirable to produce it from its compounds by more direct method than by sulfuric acid process. Cheaper production and more efficient and economic distribution are equally important to mine owner, manufacturer and agriculturist. Pyrolytic process will eventually enable fertilizer manufacturer to produce fertilizers more economically and to offer his product at lower price. WM. H. WAGGAMAN, *Chemical Age*, 7-22, 3000 w. CJW.

Tank Cars for Hydrochloric Acid. Muriatic acid tank cars with unvulcanized para rubber linings are believed to be success from viewpoint of design, cost of operation and initial cost. Reliability is marked advantage. Its success will depend upon extreme care in design and construction. J. M. ROWLAND, *Chemical Age*, 7-22, 2000 w. CJW.

Nitrogen Fixation. Description of manufacture of sodium cyanide by Bucher process. Briquets had composition: 50% carbon, 38% sodium carbonate, 12% iron. Small scale work showed that partial pressure of carbon monoxide must be kept as low as possible to prevent reversibility of main reaction, loss of sodium cyanide by volatilization from lower heat zones should be avoided (accomplished by regulating length of retort, rate of heat conduction through briquets and discharge rate) and that temperatures as high as 1050°C should be employed. Using an 8-in. retort 10 ft. long, 12.19 lbs. sodium cyanide could be produced per retort per hr. Ammonia by this process would cost about 27 to 35 cents per lb. F. E. BARTELL, *J. Ind. Eng. Chem.*, 8-22, 6000 w. CJW.

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Borates in American Potash. First potash produced from Searles Lake brine contained from 4% to 14% borax and caused marked injury to crops, the mixed fertilizers containing from 0.75% to 2% borax. Department of Agriculture thereupon issued orders limiting content to 0.1% of 1% of borates as borax. Since that time improvements in process have practically eliminated borax from the potash. Accomplished by bringing about rapid rather than normal cooling of mother liquor from precipitated sodium salts. Under these conditions the potassium chloride crystallized out but the borax remained in solution. WM. H. ROSS and WM. HAZEN, *Chem. Met. Eng.*, 7-26,22, 1800 w. CJW.

Chemical Lead. Bismuth has bad effect on lead used for concentrating sulfuric acid and is also undesirable in "chamber" lead. Little copper seems to counteract action of bismuth. Causes of failure due to defective lead are very varied. Often due to poor management. Dirt and oxide of lead skimmings are responsible in many cases for breakdown of sheet lead. Oxygen appears to have little effect, content being very small. Oxide formed during melting process very difficult to remove completely before pouring. THOMAS FRENCH, *Chem. Met. Eng.*, 8-2-22, 3000 w. CJW.

Drying Oils. It is possible to introduce chlorine into mixtures of hydrocarbons represented by so-called "neutral oils" and to remove it again by heating chlorinated compounds at 250° C. Under these conditions partial saturation of primarily formed double linkages takes place through formation of cyclic hydrocarbons. Product has drying properties equal to that of raw linseed oil. Has peculiar property of polymerization to solid, elastic mass when heated to high temperatures. May be vulcanized with sulfur chloride to form plastic materials of interest. May be compounded with rubber and similar plastic materials. Color is very dark and until method has been found of eliminating this color, use in paint will be limited to black and very dark colors. For latter purpose durability has not proved entirely equal to that of linseed oil when subjected to exterior exposure. In general, however, good results have been obtained. H. A. GARDNER and E. BIELOUSS, J. Ind. Eng. *Chem.*, 7-22, 2500 w. CJW.

Whitewashes and Aqueous Lime Paints. Exposure tests have been made for 175 formulas and definite data are presented showing effect of large number of ingredients in various combinations and conclusions are given regarding relative merits of various formulas. Of siccatives used, those such as casein, which with lime forms insoluble films, proved to be best. Water-soluble siccatives, such as glues, are not so satisfactory for exteriors. Several alkaline salts were used for accelerating solution of casein, trisodium phosphate proving to be most satisfactory. Among addition agents used with lime in mixtures containing no definite siccative, alum and salt were effective in improving workability and permanence of whitewashes. Several formulas developed and tested are shown to be superior to most of those in common use. G. J. FINK, *J. Ind. Eng. Chem.*, 6-22, 5000 w. CJW.

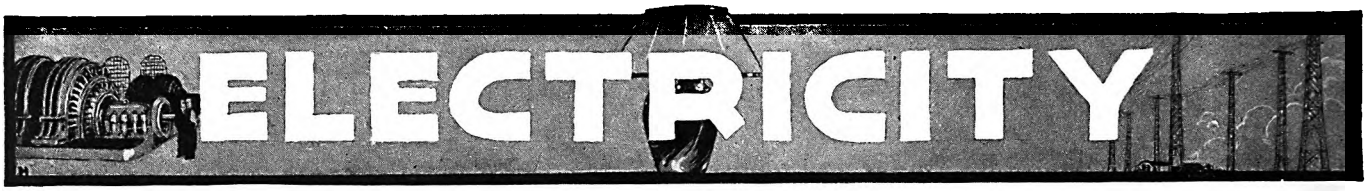
Paint Protection for Wood. Little known about values of various kinds of paints and primers for protection of wood against moisture. Moisture in wood exists in two different forms; as minute particles in each tiny wood cell cavity, known as "free water"; as moisture absorbed by fibrous material which forms walls of cells, known as "hygroscopic moisture." Dimensional stabilization of wood by moisture-proofing is proper function of paint and of world-wide significance. There is, however, decided difference in opinion among paint manufacturers as to what materials should be used, and how they should be mixed and applied. Schedule of testing is given in the article. Results indicated that paints of the ordinary brands and formulas were not very effective as moisture-proofing agents, even when three coats are applied. Preliminary tests with casein solution indicate that it has water-proofing qualities, which for some classes of protection may be very valuable; also true of some pyroxylin compounds. Varnishes are in general more effective than paint, but in protection of wheels its application is not suitable for primary coats. Need for research on this subject is strongly emphasized, and a plan for undertaking such work is proposed. Great need for good moisture-proofing paint makes this work of prime importance. C. T. MYERS, *Mechanical Engineering*, 8-22. IG.

Indigo. Brief discussion of chemistry of synthetic indigo. Gradually replacing natural indigo. No differences can be detected between two as far as dyeing cotton is concerned. Varying composition of natural indigo serious disadvantage. Most important points in application of indigo vat color are perfect reduction and uniform degree of alkalinity and temperature. Present application of artificial indigo and other vat colors in printing process depends upon use of sodium formaldehyde sulphoxylate, which is stable at ordinary temperatures and enables color pastes to be made up without difficulty and prints from machine are uniform throughout their length. Distinguishing feature is simultaneous application of coloring matter, reducing agent and alkaline solvent. Formulas for various printing colors. Discharge process allows of white and colored patterns to be produced on dyed ground. Fine delicate patterns can be discharged on dark grounds with perfection and crispness of definition quite impossible with blotch roller. Discharging agents always act chemically. W. B. NANSON, *Cotton*, 7-22, 2000 w. CJW.

Chemical Manufacturing. Business side or accounting discussed. True manufacturing yield will reveal chemical efficiency of process in question, will open way toward improving it and will give reliable line on work of manufacturing man. Plant accounts should give consumption of raw materials, production of finished products and efficiency of process. Illustration and discussion of their value. CHARLES WADSWORTH, 3RD., *Chem. Met. Eng.*, 7-19-22, 3000 w. CJW.

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Making the Electric Sign Sell Goods

INCREASED use of electric sign advertising is predicted by *Signs of the Times,* which points out that business conditions at present are very much the same as they were in the years preceding the war. From now on electric signs must do more than create good-will, they must make sales. And to accomplish this will require the intelligent cooperation of the architect, the electrician and the advertiser.

Although many architects still regard signs as a parasitic growth upon the buildings they design, a few have accepted this form of advertising and are including a sketch of the sign in the building plans just as they include the marquee and building-front display lighting. This is certain to have a favorable effect on the daytime appearance. But it is the electrician's problem to make the signs attract at night.

Because of the adoption during the last two years of higher wattage lamps for electric signs, it has become necessary to determine the relative size of the spot of light obtained from lamps of different wattages when used in electric exposed lamp displays, in order to predetermine the exact pattern of the appearance of the sign when seen at night.

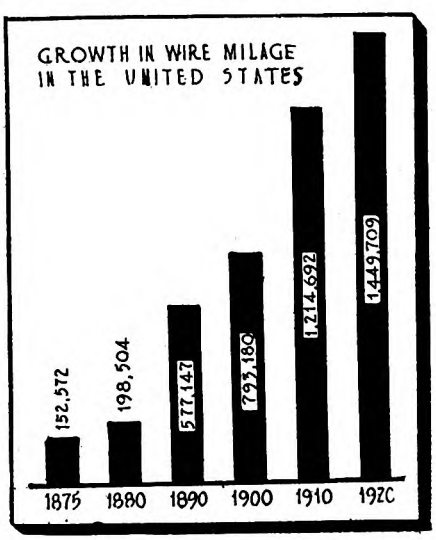
Philadelphia-Pittsburgh Section of New York-Chicago Cable. Engineering and construction features involved in a complete telephone cable system over 300 miles in length and connecting Philadelphia and Pittsburgh are described in the paper. This cable is designed to operate as an extension of the Boston-Washington underground cable system with which it connects at Philadelphia. It is also designed for operation in connection with the Pittsburgh-Chicago cable now under construction, and other cable projects included in a comprehensive fundamental plan. Beginning with fundamental factor of public requirements for communication service between cities separated by various distances, there are next considered methods available to provide this service. Small-gage, quadded, aerial cable, which was decided upon for use in this section, is described in a general way and the important advantages of application of loading and telephone repeaters are outlined. The use, in connection with this cable, of the recently developed metallic telegraph system for cables is referred to and some facts are given regarding power plants, test boards and buildings. A few of the many possible combinations of cable and equipment facilities into complete telephone circuits, which will furnish the service required as economically as now possible, are illustrated. The necessity of complete coordination of the many factors involved in a project of this kind is emphasized. JAMES J. PILLIOD, *J. Am. Inst. Elec. Eng.,* 8-22, 9000 w. WRB.

Twenty-five millions of American capital is shortly to be invested in new ocean cables. Approximately one-third of the world's cables is controlled by American capital.—*Steam Shovel & Dredge Mag.*

Hydroelectric Power Plant Design. Most logical and simplest manner in which to maintain full capacity of hydraulic power plant during flood periods is to remove high tail water from discharge opening. This may be best accomplished by use of backwater suppressor, which utilizes waste water. Development and application of method discussed. Two testing models are described and results presented, while design of draft-tube orifice is discussed at some length. Finally, plant of Alabama Power Co. on Coosa River, Alabama, where Thurlow type of back water suppressor was first conceived and applied, is described, details of its construction and equipment being included. J. A. SIRNIT, *Mechanical Engineering,* 8-22. IG.

Light without Glare. Object of paper is to show what factors must be controlled in order to produce satisfactory illumination without glare. The relative importance of brightness of light sources, their candlepower, position in the field of view and contrast with the background are discussed. The paper includes tables from the Illuminating Engineering Society Code of Industrial Lighting in which for the first time various light sources, both natural and artificial, are classified from standpoint of glare. The use of these tables is explained and illustrative examples are given. WARD HARRISON, *J. Am. Inst. Elec. Eng.,* 8-22, 5000 w. WRB.

Electrical Wiring Layouts for Modern Buildings. System of wiring office buildings is described. Different types are indicated in diagrams. N. C. Ross, *Architectural Forum,* 7-22. 3,000 w. IG.



Wire mileage has had a tremendous growth in the U. S. since 1875. Much of the growth has been due to the great increase in the use of electricity in advertising, mentioned above in "Making the Electric Sign Sell Goods."—*(Magazine of Wall Street.)*

Radio Telegraphy. Lecture first deals briefly with early history of long-distance radio communication. The work carried out by the engineers and experts of the Marconi Company in England with electron tubes or triode valves shows that, according to their experience, greater efficiency can be obtained at present by a number of bulbs used in parallel than by the employment of large single unit tubes. Information is given in a general way in regard to recent practise in design and construction of receivers with object especially of improving selectivity, reducing interference, and concerning possible speed of working. Also deals briefly with results obtained at receiving observation stations situated in various far-distant parts of world, where it has been ascertained that radio signals arriving from high-power stations situated at or near the antipodes of observation stations, reach receivers by various ways around earth, not always following shortest great circle route, and also that at such places electric waves coming around by different ways do in certain cases increase this effect on receivers while in others interfere with each other. Also noticed that apparently transmission is easier from west to east than from east to west, and that it may be necessary to modify somewhat transmission formula for long distances. Also ascertained that most troublesome atmospheric disturbances or static usually come from continents and not from oceans. Further deals with study of short electrical waves and results obtained with such waves of a length from 1 meter to 20 meters, and describes tests which show for first time that electric waves of under 20 meters in length, used in connection with suitable reflectors, are capable of providing good and reliable point-to-point, unidirectional system of radio over quite considerable distances. Application of this system as direction finder in aid of navigation, and as method for preventing collisions at sea, is also dealt with.—GUGLIELMO MARCONI, *J. Am. Inst. Elec. Eng.,* 8-22, 12,000 w. WRB.

Carbon Electrode Industry. Series of six articles. First discusses history of development of industry. Has been along four lines: Electric arc lighting, electrolytic manufacture, electrothermic work, and electric furnaces. Carbon electrodes enter into manufacture of following

materials: electric steel, ferro-alloys, calcium carbide, silicon carbide and related abrasives, aluminium, calcium and magnesium metals, phosphorus and phosphoric acid, electrical resistance wire, titanium and zirconium, carbon disulfide, tungsten, fixed nitrogen, sodium caustic soda and chlorine, electric furnace alloys. Second article discusses raw materials. Electrode requirements. Raw materials consist of coal, coke, petroleum coke, retort and gas carbon, natural graphite, pitch coke, wood charcoal, lampblack, and amorphous butts from electrothermic work. Binders are divided into three classes: Liquids (retort-gas, oven-gas and water-gas tars), semi-solid (electrolytic pitch) and solid (coal-tar pitch). Viscosity is more or less measure of binding power of material. Binders are tested for melting and softening points, viscosity, free carbon and coking value. Carbonaceous substances are analyzed for moisture, volatile matter and ash, if they are to be used for electrothermic work, and for iron and silicon if used for electrolytic electrodes. CHARLES L. MANTELL, *Chem. Met. Eng.* 7-19, 26-22, 6000 w. CJW.

New Electric Steel Furnace. Lewoz (French) type embodies the conditions set down by Campbell as necessary for proper refining (closed and simple construction; separation of electrical fittings of generator and transformer from furnace; application of heat at center of bath to save linings; large slag area; fluid slag of high basicity, etc.). Details are indicated, also special constructional features to attain desired ends. R. SYLVANY, *Canadian Foundryman*, 7-22, 1800 w. APS.

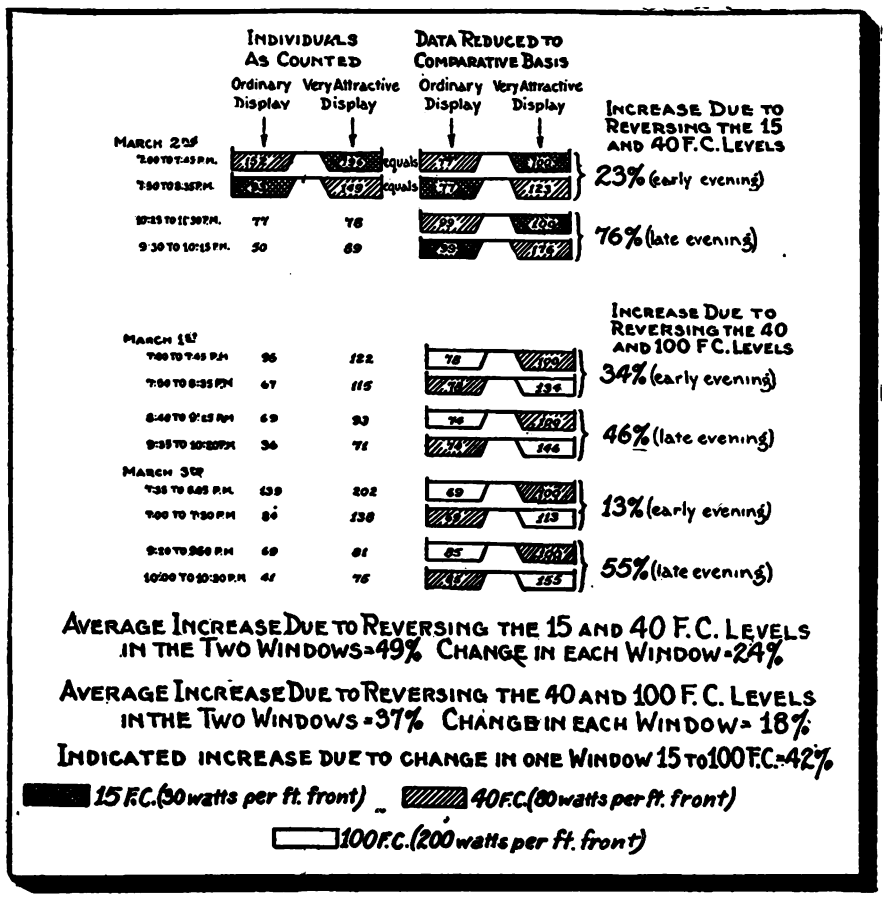
Single-Phase Electric Furnace. Difficulties are usually in the out of balance effect produced by taking a single phase load from a two, three or polyphase generator, but several means of overcoming this are used. The furnace with its single movable electrode is easier to regulate. Construction details, electrical characteristics and efficiencies, electrode consumption, power consumption, furnace control, linings, raw materials and working details. H. P. ABEL, A. A. LIARDET and W. WEST, *Iron and Steel of Canada*, 7-22, 400 w. APS.

Electric Drives for Flour Mills. Discussion of the advantages of electric drive for flour mills. Increased safety in operation of mill, doing away with heavy main transmissions, saving in power by elimination of belts, and uniformity of speed are among the advantages mentioned. W. T. EDGELL, JR., *American Miller*, 7-22. IG.

Electric Lamps and Safety Devices. Safety devices needed because of danger of breakage of bulb and exposing naked filament. Recommends more attention to careful maintenance of safety devices of portable electric lamps and discourages use of any modification that interferes with proper operation. Though time lag in ignition of gaseous mixtures is admitted, tests show that lag of filaments burning through is greater and consequently can by no means be relied upon as protection against gas ignition. L. C. ILSLEY, Reports of Investigations, Bureau of Mines, No. 2371 (July, 1922), 9 pp. CJW.

That Phantom Circuit Service. Article describing how these circuits should be constructed and operated. It is pointed out that grade of service obtained is dependant on care taken in construction and maintenance of circuits. Such factors as length of particular toll lines, conditions of exposure and class of service must be taken into consideration before an economic answer to query as to advisability of using phantom circuits. Details of line construction are given; arrangement and condition of side circuits are described. Central office requires additional apparatus when phantom circuits are used. Phantom circuits will give high-grade service if all essential requirements of such circuits are fulfilled. C. J. LARSEN, *Telephony*, 7-22-22. IG.

Electrical Resistance of Treated and Untreated Cross-Ties. Report of investigations by Forest Products Laboratories, to determine electrical resistance to the earth of rails on untreated ties and rails on ties treated with various preservatives. Condition of the ballast has a great influence on the resistance. Wear on the surface of the ties or in the ballast has a greater effect on the resistance than differences in treatment. Old ties in the track gave a lower average resistance than the untreated white oak ties, but both of these sets showed greater resistance than the ties treated with zinc chloride or sodium fluoride. Greatest resistance in the test was shown by the oil treated ties. P. R. HICK, *Southern Lumber J.* IG.



Relative drawing power of different levels of illumination in a Fifth Avenue (New York) display window, expressed in terms of number of people stopping to view the display.—*(Electrical Merchandising.)*

Transformers for Motor Starting. Method for application of reduced voltage for starting alternating-current motors is described. Motors started from taps on power transformers. Starting of rotary converters is also described. Auto-transformers are used for motor starting. Various diagrams showing connections are given. J. B. GIBBS, *Power*, 7-25-22. IG.

Loud Speaking Telephone Apparatus. Bell loud speaker consists of sensitive microphone for picking up voice of speaker, voice-current amplifier for increasing magnitude of voice currents, loud speaking receivers with projectors for reproducing sounds and current-supply apparatus and suitable circuits and control devices. Each piece of apparatus is described. Studies have shown that most natural and pleasing results are obtained with projectors grouped in cluster rather than distributed about area to be covered. Same set of amplifying apparatus can be used with radio transmission as with wire transmission. *Telegraph and Telephone Age*, 7-16-22. IG.

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FUEL·POWER

Prepare for Peak Demands for Gas

ALTHOUGH at present the gas industry's chief concern in regard to the coal strike is the possible interruption of the supply for their own plants, there is a much more serious phase of the matter—the effect of the strike upon the peak demand for gas. Even if the bituminous miners return to work at once a famine cannot now be avoided. And in the case of anthracite it is believed that it will be long after the beginning of cold weather before anthracite consumers will be adequately supplied. Consequently, the demand for gas for heating purposes is certain to be heavy, and the sale of heaters will be proportionately large. In order to meet this demand, says *Gas Age Record,* generous stocks of heaters should be purchased and plans should be made for the maximum output of which the works and the distribution system are capable. Every machine should be ready for action at full speed. If the anthracite strike is not ended soon, they are certain to be needed as they never were before. Preparations should be made now to provide for the exceptional peak loads that are certain to be needed during the coming fall and winter.

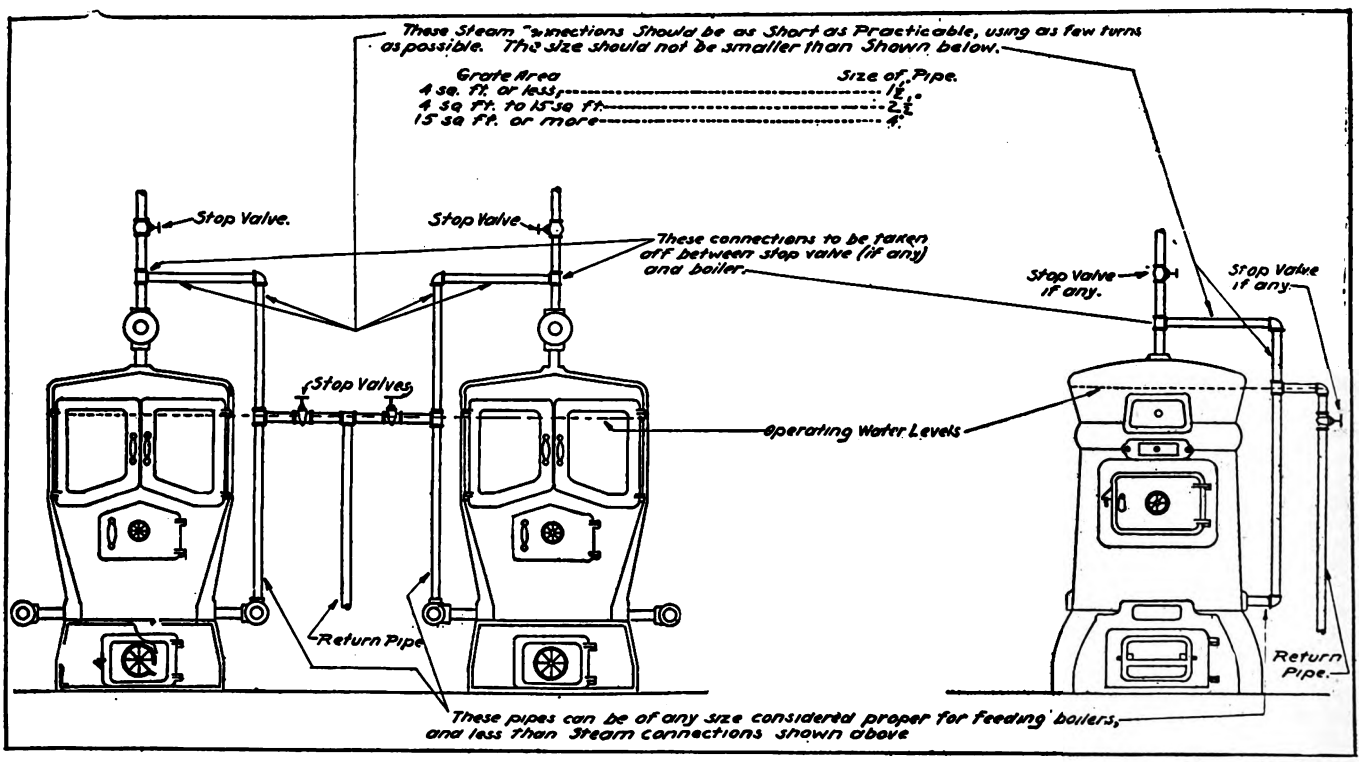
Clean Coal. Shuler Coal Co Waukee, Iowa, has arrangement by which coal is cleaned before weighing. Coal fed to picking table car by car, with intervening space so that each car can be identified. Refuse from picking table is passed to slate bins while coal is passed into 3-ton weigh hopper, weighed and dropped into feeder hopper located above shaking screen. This plan prevents discrimination in judgment of quality of coal mined, which is basis of payment. M. W. HIBBARD, *Coal Age,* 6-29-22, 750 w. CJW.

Mineral Matter in Coal. Main constituents of coal ash are silica, alumina, ferric oxide, calcium oxide, magnesia and alkalies. Four distinct constituents of coal are discussed in relation to the distribution of ash in coal. System of froth flotation utilizes specific surface properties of coal components for effecting their separation. Pure coal attaches to itself film of oil needed to raise it in frothing mixture, while shale and other dirt particles do not. Effect of ash on behavior of coals in furnaces. Need for systematic work on incidence, distribution and behavior of ash in coal. *Western Canada Coal Rev.,* 7-22, 1500 w. CJW.

Ignition of Coal Dust. Coal dust in air can be exploded by electric arcs under conditions that might prevail in mine or around pulverized coal plant. If electrical machinery is in places where coal dust is liable to collect in quantities capable of producing dust cloud, such machinery should be housed in compartments designed specially for use in dusty atmospheres. L. C. ILSLEY and E. J. GLEIM, *Report of Investigations,* Bureau of Mines, No. 2365 (1922), 7 pp. CJW.

Pennsylvania last year led all the States in the use of explosives.—*Steam Shovel and Dredge Mag.*

Coking Illinois Coals. Illinois coals will not coke in ordinary ovens because they lack humus and resinoid bodies which act as cements during coking process. Roberts by-products coke ovens have overcome difficulty; these have no flues in walls. Heating gases are in contact with large surface and heat thus absorbed is transmitted rapidly to coal through small surface which forms walls of coking chamber. Gas used for heating is admitted at top of heating wall at point 16 in. below coal line, where it meets air for combustion. Control important part of ovens. Second point for admission of gas located halfway down wall, where primary gas (from 16 in. opening) is exhausted. Burning of this secondary gas is subdued by inerts and generation of heat is continued in same uniform manner as in upper part of wall. Products of combustion passed through recuperators, which heat air for combustion as high as 2000° F. Percentage of breeze is only 3.7%. Yield of



(Power)

Method of connecting returns to two or more boilers without check valves.

Connecting returns to a single boiler without check valves.

coke is 70%; tar, 8 gallons, ammonium sulphate, 25-28 lbs., per ton of coal. H. A. PATTERSON, *Coal Age*, 7-13-22, 2000 w. CJW.

By-product Gas. Terms cover manufactured city gas. Low flame temperature idea due to misconception. Possible to get cleaner weld with gas than with either oil or coal. Success due to premixing of gas and air in proper proportions before combustion. Gas of low BTU cheaper to manufacture. Discussion of application of gas to glass manufacture, ceramic industry, rivet heating, manufacture of food products, in automobile industry, steel treating. Brief mention of furnace design and consumption of gas. Three factors enter into combustion; fluctuation of gas pressure, and insufficient gas or air. Fundamental underlying complete combustion is homogeneous mixture. Gas saved by correct proportioning of gas and air may be as high as 55%. HARRY DOBRIN, *Gas-Age Record*, 6-10-22, 3000 w. CJW.

Fuel Devices. Tests of so-called gas-saving devices, which cause spreading and lifting of flames to such extent that smothering of flame results when utensil is placed above burner. No marked increase of efficiency can be expected where these devices are used. They break up flames as they leave ports, mix flames into one mass and thus exclude to large extent supply of secondary air necessary for complete combustion. Poor aeration of flame results in rapid liberation of carbon monoxide in sufficient quantity to be positive menace to health. Bureau of Standards. *A. G. A. Monthly*, 7-22, 1000 w. CJW.

Burning Boiler Oil in Diesel Engines. Method of accomplishing this feat is described. Main difficulties encountered are high heat required to burn the asphaltic residue, production of sulphurous acid gas in cylinders with tendency to corrode the valve seats, viscosity of fuel must be reduced to permit handling with pumps and produce proper atomization in cylinders. A great deal of responsibility is placed on the operator by reason of the shut-downs that may be caused by clogging of valves, deposits in cylinders, sticking of piston rings, etc. Difficulties may be overcome by starting engine on light oil and shifting to heavy after the engine is hot, maintaining high compression and regulating the jacket-water temperature to insure higher compression. By shifting to light oil a short time before shutdown, all surphurous acid gas will be cleared out of the cylinder before exhaust gases are cool enough to condense the water vapor. Hot water heaters are used to reduce the viscosity of the oil. L. R. FORD, *Power*, 6-4-22. IG.

Water-power Development. Discussion of production, maintenance, and selling costs and fixed charges. Interesting schedule of economic considerations, observance of which may lead to more satisfactory solutions of problems outlined. Water-power development does not pay at this time because public will not invest in securities at interest or dividend rates which permit financing of such undertakings on basis of present permissible earnings. Because of individuality of each project and ever present hazard, it certainly ranks as greatest sport on earth. CURTIS A. MEES, *Mechanical Eng.* 7-22, 4000 w. CJW.

Manufacturing Losses. May be due to too expensive power, wrong kind of power, overload or underload, irregular load, improper prime-mover speed for given power. Too expensive power may be caused by wrong location, unwise contract for water current or fuel. In figuring cost of power one must consider fuel consumption, price of fuel per BTU, size of units and station, ratio of yearly output to possible maximum output, capital or fixed charges and operating expenses. Discussion of other factors. ROBERT GRIMSHAW, *Industrial Power*, 6-22, 750 w. CJW.

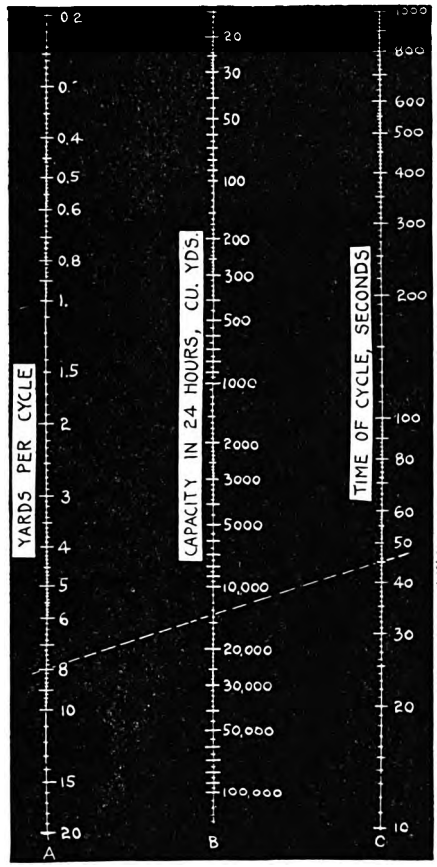
Power Transmission by Belting. Characteristics of leather belting and charts to simplify the calculations. Author takes up vertical belt drives, relation of belt thickness to pulley diameter, speed as a factor in the selection, idler pulleys and their influence, and other similar topics. PETER F. O'SHEA, *Machinery*, 6-22, 3300 w. MAH.

Purchased Power. Power factor varies widely in different coal fields. In Illinois unusually low annual load factor. Maximum demand for power lasts for only 8 hours, and is followed by low demand for 16 hours. This results in extremely low boiler performance. Central station power has advantage in such case and can be supplied at large saving over cost of power generated at individual power plants. These advantages enumerated and discussed. Estimated that in many regions 90% of coal mines are using purchased power. J. PAUL CLAYTON, *Coal Age*, 6-29-22, 2000 w. CJW.

Power Plant Economies. Various items are responsible for loss in fuel consumption: failure to keep accurate records, accumulation of scale and soot, air leaks, failure to maintain piping systems in condition and failure to follow rules of combustion. Records are of no value unless story they tell is heeded. Scale accumulation can easily cost $12,000 a year. Soot has been known to cost $15,000 per year. Valuable suggestion is given here for use of recording thermometer installed in blow off tank to show whether or not all cocks are tight at periods of blowing down. G. E. WOOD, *Coal Industry*, 6-22, 2000 w. CJW.

Furnace Insulation. Principal advantages are: material saving in fuel, increased capacity from same equipment, more uniform distribution of heat throughout the furnace, greater ease of temperature control, furnaces retain high interior temperature between operating periods, shortening time necessary to bring them up to temperature, better working conditions in front of furnace, longer life to steel door frame, lighter weight equipment, easier to handle. Requirements for heat insulators. E. F. DAVIS, *Gas-Age Record*, 7-1-22, 2000 w. CJW.

Detonators. Description of lead plate test (illustrations given) for detonators. Efficiency of detonators influenced by size of charge, moisture, potassium chlorate content, indentation of shells and hardness of detonator shells. Each factor discussed. "Know your detonator" should be adopted slogan of every user of industrial explosives. BENNETT GROTTA, *Chem. Met. Eng.*, 6-14-22, 4000 w. CJW.



A Handy Coal Handling Chart

For quickly determining the capacity of any coal handling bucket or shovel knowing the number of tons of coal handled per bucket or per shovel and the time interval of each cycle. Lay a straightedge across chart, or stretch a thread across it, and the problem is solved. For example, assuming that a given power plant will handle 8 tons of coal per cycle and a bucketful every 45 seconds. What is the capacity of coal handling apparatus, assuming an efficiency of 90 per cent? Run a straight line through the 8 tons (column A) and the 45 seconds (column C). The intersection with column B gives the answer as 13,800 tons, which is as close as can be read with the eye. The exact number is 13,824 tons. Chart will be found useful for selecting required coal handling apparatus working intermittently, such as a hoist and is good up to capacity of 100,000 tons per 24 hours. If a certain capacity is desired and tonnage per cycle is known, chart will give the minimum time that can be allowed for each style. Or, if the time of the cycle and the capacity of the bucket are known, the tons per cycle is easily determined.—*(International Steam Engineer.)*

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Steel Prices Rise as Coke Goes Up

CURTAILMENT in iron and steel operations continues as a result of the fuel situation. Many furnaces are being banked and numerous rolling mills have greatly reduced their output. According to *Iron Age*, the most serious curtailment has been in eastern Pennsylvania at Johnstown and in the Mahoning and Shenango valleys. Nearly all the by-product plants are receiving considerably less coal. Many have had to check operations, while others are rapidly using up their stocks. A 30-day stock is said to be the greatest at any by-product plant.

Coke prices have advanced and Connellsville foundry coke has been sold at from $14.50 to $15 a ton, an advance of $4.50 to $5 within a week. Quotations on furnace coke are nearly as high. Due to this scarcity, there is a decided upward tendency in pig iron prices. Advances range from 50 cents on Alabama iron to as much as $3 in some Northern centers on foundry and malleable grades. Foreign pig iron has already advanced as a result of the increased demand and higher freight rates, which have been brought about by contracting for the shipment of coal from England to the United States.

Commercially Pure Iron. Relation of chemist to manufacturing. His work of analytical control begins with the raw material and ends only when the finished product has passed the most exacting tests. Details of the analytical methods with photographs. D. M. STRICKLAND, *Raw Material*, 7-22, 1500 w. APS.

European View of Malleable Iron. In Europe malleable iron has not attained the success reached in the U. S. At joint French and Belgian foundry congress in September, 1921, the prevailing opinion was that systematic experiments and cooperation would lead to the industry obtaining its proper place. Discussion of specifications, suitable metal, furnaces. The German method is discussed. Analyses of products. T. LEWOZ, *Canadian Foundryman*, 7-22, 4000 w. APS.

American vs. British Gray Cast Iron. American cast irons of their respective classes are considered inferior to the British irons of corresponding classes. American irons fail under superheated steam, while British stand up. Numerous similar comparisons. Methods of testing. Sulfur is not regarded as very dangerous nor is phosphorus up to 1% if evenly distributed. Importance of blast furnace temperature. F. J. COOK, 6-15-22, 2500 w. APS.

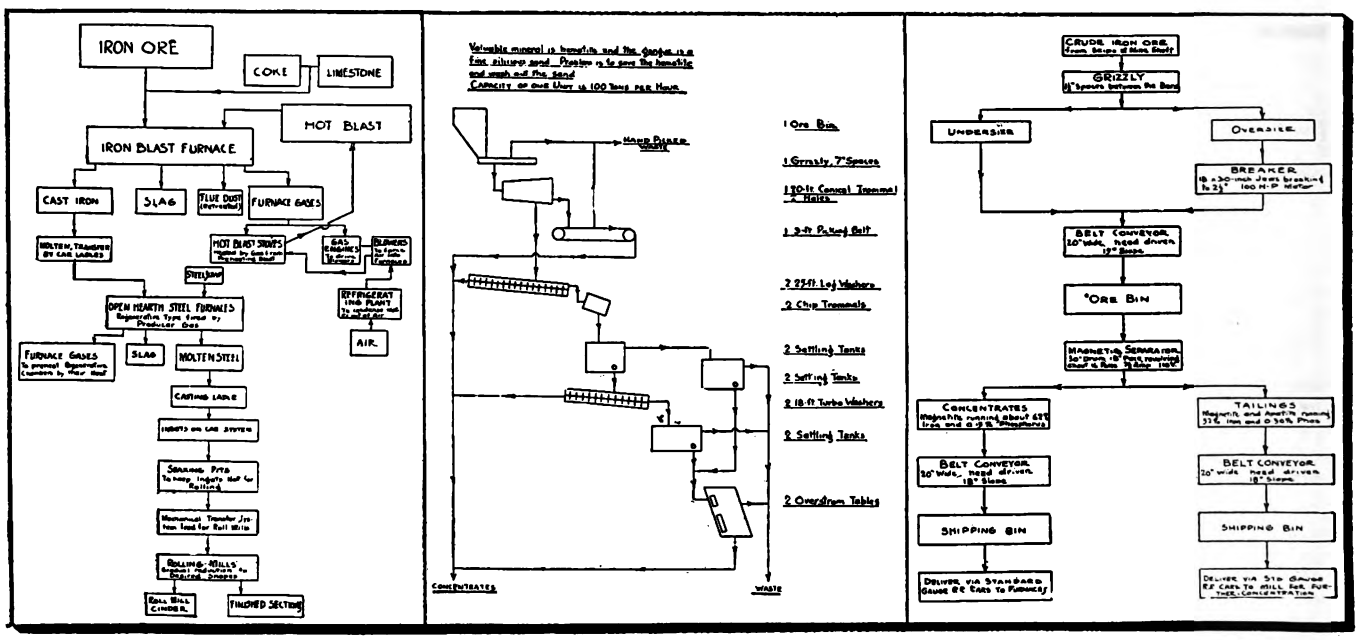
Fiber in Iron and Steel. Importance of fiber in the performance of iron or steel under test or in service, and the factors which govern its formation and character. Discussion includes data from Kothny's paper in Stahl and Eisen, May 20, 1920, and the important conclusions arrived at in that paper. Author's belief is that fiber is due to non-uniform distribution of carbon rather than presence of insoluble oxides. F. F. MCINTOSH, *Amer. Soc. for Steel Treating*, 7-22, 8000 w, 15 figures. APS.

Factors Influencing Mass Heat Treatment. Most occur before actual operation of heat treatment itself. Mechanical design, chemical composition are important. Little relation exists between the physical properties of large and small masses, and heat treatment suitable for small specimens is at most only a general criterion for heat treatment of large masses. W. B. CROWE, *Amer. Soc. for Steel Treating*, 7-22, 5500 w. APS.

Castings Direct from Ore. Ore melted in an ordinary blast furnace is kept in a 75-ton vacuum container constructed like a huge thermos bottle. Chemical analysis is taken after which it is mixed with cupola iron. Still in experimental stage. F. H. BELL, *Canadian Foundryman*, 7-22, 1500 w. APS.

Ball Steel. Almost a small text-book on the industry. Kinds of steel used and treatment. Chief types of defects. Methods of producing the spheres. Numerous excellent illustrations show the nature and cause of these defects. Methods of hardening and results. Quenching by oil and by water. Tolerances of raw material. Methods of testing balls. Dies and die steel for balls in relation to costs. The bounce test as a modified hardness test. HILTON G. FREELAND, *Amer. Soc. for Steel Treating*, 7-22, 12,000 w. APS.

Rapid Methods of Determining Chromium in Steel. List of more valuable rapid methods with references to the original articles. A. S. TOWNSEND, *Forging & Heat Treating*, 7-22, 2000 w. APS.



Three types of flow charts—(left to right): (1) process or operations type, showing production of steel from iron ore; (2) machine type, showing ore-dressing plant; (3) combination type, showing cobbing plant for iron ore containing two ingredients.

Corrosion of Chromium Steel. Several pure chromium steels, in cast, forged and heat-treated conditions, were observed during immersion in dilute hydrochloric acid and in aerated distilled water, and the relative resistance studied. Pure iron and steels of low chromium content were found to be much more resistant to attack by acid than those containing considerable chromium. When corroded by water and air the general order of resistance was reversed. The addition of nickel is much more effective in reducing intensity of attack by the acid than is chromium. Specimens having a polished surface were found, almost invariably, to show smaller loss in acid than those which were rough ground. No single type of non-corrodible steel appears to be suitable for each and every purpose which may arise. H. S. RAWDON and A. I. KRYNITSKY, *Chem. Met. Eng.*, 7-26-22, 2000 w. CJW.

Spheroidizing of Cementite in Steel. Results of test on 1% carbon steel show that a long time anneal is not necessary to obtain the spheroidized structure—a spheroidized steel shows increased ductility and shock resistivity. H. C. IHSEN, *Forging & Heat Treating*, 7-22, 2000 w. 13 figures. APS.

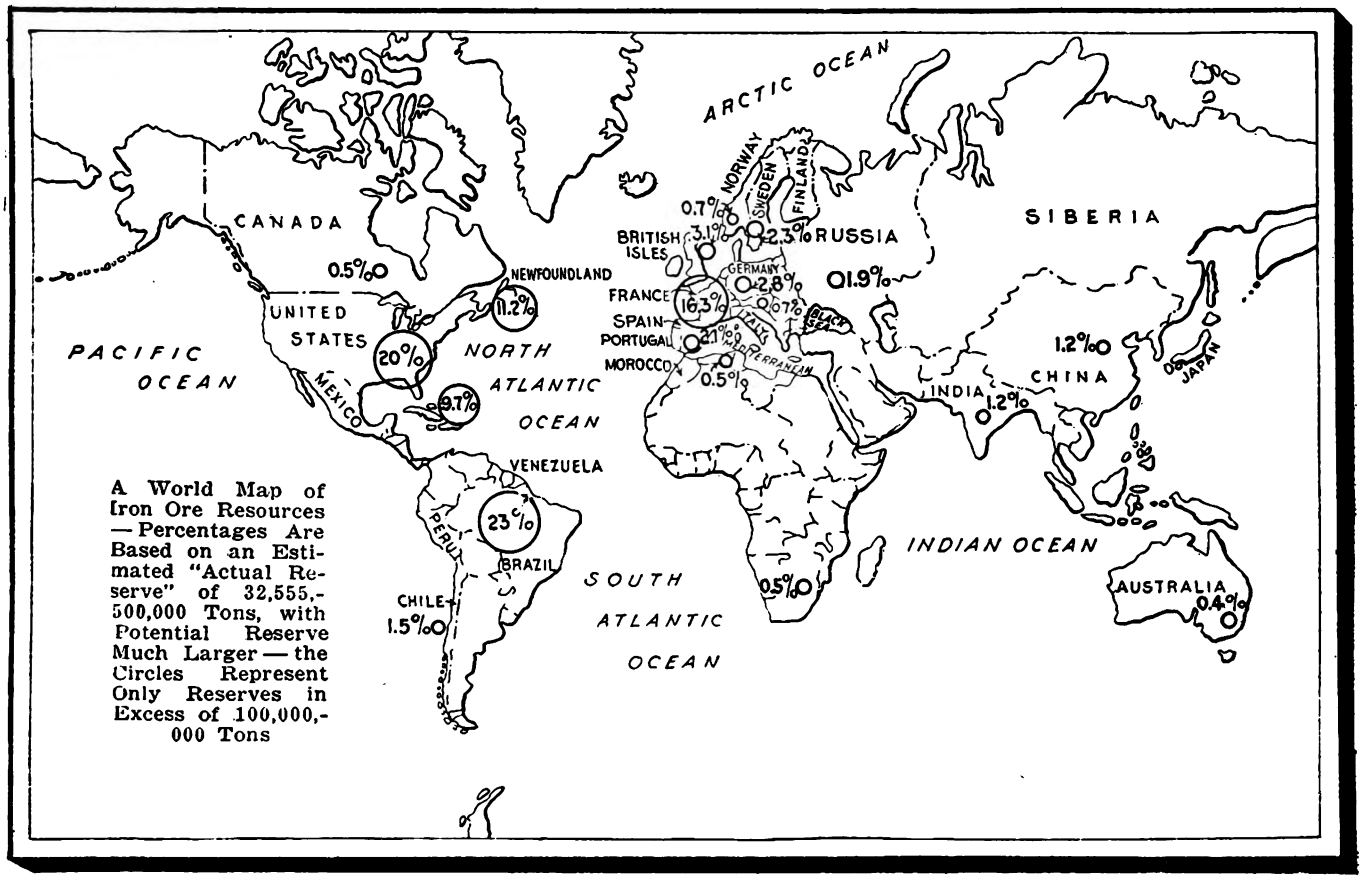
Physical Tests on High-Speed Steels. Transverse and tensile tests of two grades compared. Effect of these properties on the service of the tool. 18% tungsten, 1% vanadium type and 14% tungsten, 2% vanadium type were tested. Concludes that tools possessing the proper analysis, hardness and red hardness, together with the highest possible physical strength, will give the most satisfactory service. Numerous diagrams. A. H. D'ARCAMBAL, *Iron Age*, 7-6-22, 1800 w. APS.

Manufacture of Light Steel Castings. Deals with author's practical experience of a general jobbing steel foundry making all classes of steel castings from a few ounces up to 14 tons in the rough and with metal of carbon content varying from 0.08% to 1% and over, and additionally in chrome and manganese steels. H. BRADLEY, *Iron and Steel of Canada*, 7-22, 1800 w. APS.

Decomposition of Martensite into Troostite in Alloy Steels. Of the alloying elements only manganese, silicon and chromium showed a marked effect in this decomposition. Manganese increased the intensity of the transformation, the other two raised its temperature. None of the alloying elements lowered the transformation temperature. the significance of these results in heat treatment of alloy steels is discussed. HOWARD SCOTT. *Forging & Heat Treating*, 7-22, 2000 w. APS.

Progress in Open-Hearth Process. It will be found interesting to compare this paper with one on British practice in *Iron Age*, 7-13-22. Heat losses by escaping gases, radiation, conduction, etc., total 95.77% of incoming heat units, indicating the possibilities of fuel savings. The blow-torch or Bunsen burner type of installation with pre-mixing of air and gas is fully discussed, especially the possibility of eliminating regenerators. WILLIS MCKEE, *Iron Age*, 7-20-22, 2200 w. APS.

New Process for Mechanical Puddling. Titan Iron and Steel Works installing complete unit of cupola, ten mechanical puddling furnaces and a mechanical squeezer for handling the large balls. The furnace is of the oscillating type, the molten pig iron is introduced through one hollow trunnion and fuel oil through the other. The products of combustion pass out through charging port. There is a dam in the furnace over which the material is repeatedly poured in a thin stream by the oscillating motion. *Iron Age*, 7-20-22, 1500 w. APS.



A World Map of Iron Ore Resources — Percentages Are Based on an Estimated "Actual Reserve" of 32,555,500,000 Tons, with Potential Reserve Much Larger — the Circles Represent Only Reserves in Excess of 100,000,000 Tons

With a known reserve for the world of from 30 to 35 billion tons, assuming that the consumption of ore steadily increases, there is enough proved reserve to supply the requirements of the world for over 75 years. With a potential reserve of over 100 billion tons, there would probably be enough ore for between 150 to 200 years. It seems to be agreed by authorities that the reserve of iron ore in the world will be sufficient to supply the requirements for 200 years or more. According to Clarke, the American geologist, the crust of the earth contains 4.4% of metallic iron, a small fraction of which has been concentrated by geological agencies to form commercial iron ore, and for every ton of these ores containing 60% of metallic iron there are many tons that contain 50%, many more tons that contain 40%, and so on.—*(The Iron Age.)*

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More Speed in Glassware Manufacture

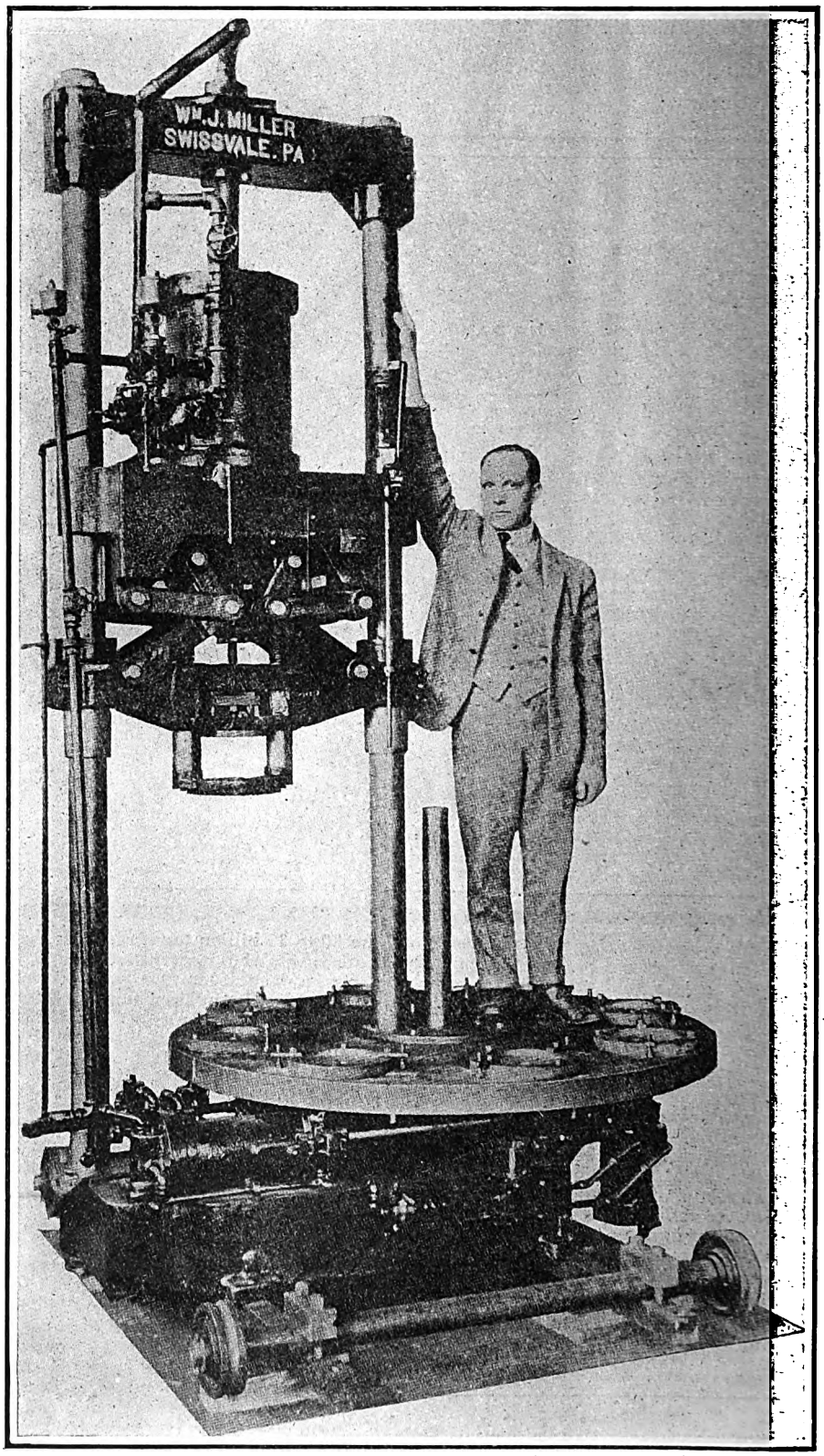
THIS machine, the largest automatic glass press ever built, is 11 feet in height,, covers a floor space of 7x7 feet and weighs 8000 pounds. The machine mounts eight moulds 16 inches in diameter and 18 inches high, and has a plunger stroke of 14 inches, delivering a maximum of 150,000 pounds pressure to the plunger. Its maximum speed is 25 articles per minute. It is designed to operate in conjunction with the large size Miller feeder, which automatically transfers the molten glass from the tank to the moulds.

The machine is a high-power toggle press. The pressing is performed by an air cylinder and piston operated in connection with the toggle mechanism. The toggle press is said by William J. Miller, maker of the large press, to be the last word in scientific glass machinery design, as it combines the desirable features of the side-lever press with the saving features of modern glass machines.

The smaller size toggles are generally employed for making pressed ware, such as automobile headlight lenses, tableware and tumblers, whereas this large machine will make a general line of very large pressed ware, such as battery jars, punch bowls, inverted shades, etc., heretofore made at slow speed and high cost on a side-lever press employing from two to three gathers and from two to six men on the levers.

The functions of the toggle are: First, to gradually increase the power of the pressing stroke as the plunger advances into the glass and meets a gradually increasing resistance; second, to insure application of correct degree of pressure to the glass, be it cut under or over weight; third, to quickly adjust the maximum degree of pressure applied to the glass; fourth, to gradually reduce the speed of the plunger's penetration into the glass as it nears the filling point; fifth, to conserve the air consumption.

The introduction of the automatic feeders makes it imperative to have heavy presses of great strength and mounting a greater number of moulds than did the manual fed presses. Other presses similar in construction to the one illustrated are built to mount from three to ten moulds. The demand for heavier, larger and faster machines is constantly increasing. As each year passes additional improvements are being worked out, and it is predicted that within a few years the old side-lever press will be relegated to the museum.—*(National Glass Budget.)*



Here is the world's largest automatic glass press, which can make 25 articles per minute.—*(National Glass Budget.)*

LEATHER

Shoe Manufacturers Look for Busy Winter

ACCORDING to *Boot and Shoe Recorder* a more orderly style period is approaching. The trend appears to be away from extremes and it is believed that the substitution of real values for novelties will result in more contented customers. For this reason, as well as because of the general business improvement, the outlook for the shoe merchant during the next six months is distinctly encouraging.

The style program issued by the National Shoe Retailers Association and the National Boot and Shoe Manufacturers' Association, contains much valuable information for shoe merchants. This report shows that there is no alarm over longer skirts influencing present stocks in street, sport and afternoon wear. For the remainder of the year sales will be more normal as practically all requirements can be met from present holdings as well as from purchases made up to December 31. The most popular materials in women's shoes are patents, brown kid or calf, and black kid or calf, medium tan calf and satin. In men's shoes colored leathers will probably constitute 50% of the sales. The prevailing colors will be cherry red, Cordovan red shades, medium brown and tan Russia in both plain and boarded leathers.

In the turns and evening types of women's shoes *Boot and Shoe Recorder* believes that merchants should watch carefully the trend of dress lengths in their communities for the reason that with longer skirts there will be higher heels and the possibility of introducing strip pumps and colonials with considerable success.

In men's shoes the hope is that selling conditions will inprove in the possibility of better appearance in men's attire. Smarter shoes for men are already making their appearance and the problem appears to be the proportion of boots as against oxfords for winter wear.

Leather Finishes. Tanners must get away from pigments as much as possible if leather is to be salable. Satisfactory finish has been prepared from aniline base. In applying finishes, special attention should be given to bottom of skin. On fairly good bottom finish should be diluted at least 500% for first coat. For calf skins three highly diluted coats with glazing after second and plating after third can be used to good advantage. For glazed kid leather, one coat is sufficient, while for sheep skins two coats are sufficient and rolling after first coat and glazing after second gets good results. *Leather Manufacturer*, 7-22, 500 w. CJW.

Compressed Air in Tanning. Used for agitating liquor in main mixing tanks and other vats employed in process and has proved superior to hand or power driven paddle, not alone because of increased production obtained but in improving action of liquors to marked degree. Agitation by air insures thorough mixing of liquors in vats and is more reliable and less troublesome in its operation than other forms of mechanical agitation. General discussion of tanning process. R. G. SKERRETT, *Compressed Air Mag.*, 7-22, 2000 w. CJW.

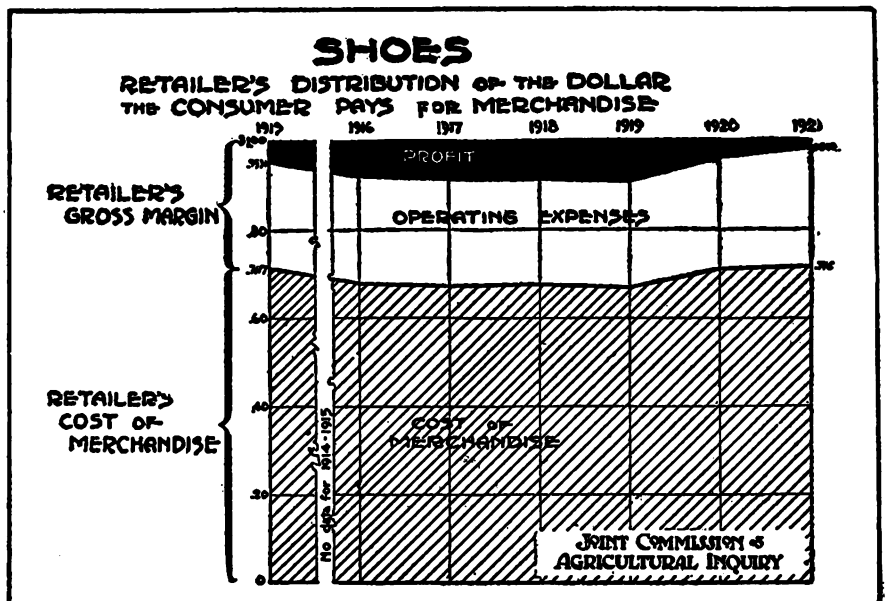
Recovery of Chrome Salts. Excess of chrome salts may be recovered or old bath may be employed for other tanning operations. New process of recovery consists in neutralization with alkalile agent, filtration from suspended matter, precipitation of alkali by soluble carbonate, concentration of filtrate and souring of concentrated liquors for transforming into bichromates the normal chromates. *Leather Manufacturer*, 7-22, 1500 w. CJW.

The inner bark of a Japanese shrub can be made into an imitation leather as tough as French kid and as pliable as calfskin.—*Steam Shovel & Dredge Mag.*

Water Tests. Leather may be tested by turning hose on it, by making bowl and filling it with water, by actual wear in woods (snow), by putting it in the shop tub, or by moistening handkerchief with saliva or water. These tests may show up defects in finishes or tannages and give idea of what will happen to grain. But real quality and durability of leather depends upon strength of fiber that is beneath finish and strength of fiber primarily depends upon strength of the beast that grew the pelt. *Leather Manufacturer*, 7-22, 400 w. CJW.

Joining Belting. Laced joints are not smooth and even in operation over pulley. Temporary slipping on pulley as wire-laced joint passes over it. Cementing best method. Requisites are that two ends must be brought together perfectly square with each other and that faces of joints must be perfectly smooth and even bevel from heel to point. Cement must be applied hot and well worked into fiber of leather and pressure should be applied before cement sets. If waterproof cement is used, necessary to size leather before cementing. L. W. ARNY, *Leather Manufacturer*, 7-22, 1000 w. CJW.

Shoes cost nearly as much as our daily bread. This is the startling fact brought out by government statistics when they show a national shoe bill, a little less than the national wheat flour production. Scientists are endeavoring to take the pinch out of the billion dollar shoe bill by new discoveries for cheaper tanning. Hides for certain purposes can now be tanned in eight hours.—*Steam Shovel and Dredge.*



The shoe retailer's distribution of the dollar the consumer pays for merchandise. The largest amount of profit per dollar of sales occurred in 1919, an average figure of 9.36 cents. Profits rose gradually, beginning in 1913 with 4.69 cents. From 1919 a decline began, showing 1.52 cents for 1921. Profits over the entire period averaged 6.19 cents.

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MACHINERY

All Kinds of Machine Tools in Demand

A DEFINITE improvement appears to have taken place in the machine tool industry says *Machinery*. The average orders of 79 firms in this field during the month of June amounted to 25% of the shipments for the entire first three months of 1920. Seven of these firms reported a business amounting to more than 50% of the total during that period, and 18 of over 30%. These comparisons are made on a dollar-and-cents basis. If the lower prices of machine tools at the present time are considered the actual volume of machines sold will reach much higher percentages than those mentioned.

There is great difference in activity, according to the line of machines being built. Grinding machines are in wide demand. Orders for special machines for high-speed production are in greater evidence than orders for standard lines of machine tools, for which condition the automobile trade is responsible.

One of the encouraging signs is the brisk demand for grinding wheels which indicates that the metal working industry as a whole is resuming its activity. The screw products shops are also well occupied. A few months ago very low prices were quoted for screw products but this condition is now improving. The sheet metal stamping shops in the Middle West are generally fully occupied; in New England they are running at from 50% to 80% of capacity.

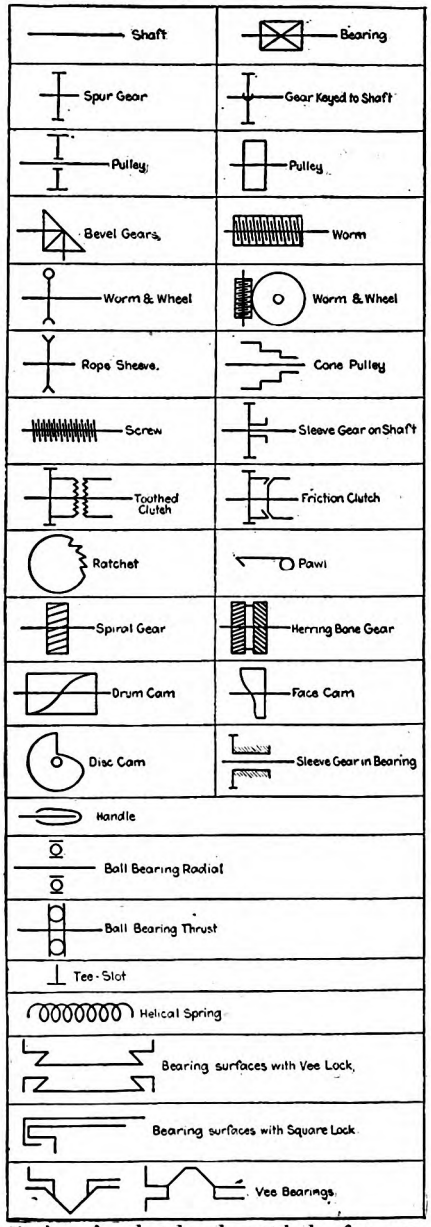
Several machine tool manufacturers have announced increases in their prices and it is expected that there will be a general advance since it is claimed that labor rates and material costs have not been sufficiently reduced to warrant the prices that have been quoted during the last eighteen months.

Using the Camera to Help the Machine Shop. Author points out that drawings and sketches are the universal language of the machine shop, and makes a plea for photographic copies of tracings and sketches rather than blue prints on the one hand, or the use of the original sketch on the other. Proves photographic copies are a satisfactory method and the installation for making them not as expensive as an electric blue print machine installation. ROBERT MAWSON, *Can. Machinery*, 6-1-22, 1750 w. MAH.

Construction of Adapters for Turret Lathe Tools. Many tools available in the modern shop will not fit all of the machines, especially all the turret lathes, since these have different sized turret holes. This calls for various bushings, extensions, attachments, brackets, bars, and other adapters. Under this broad title of adapters, the author discusses all these, and method of planning and making many of them. FRED HORNER, *Can. Machinery*, 5-11-22, 2700 w. MAH.

Testing Gear and Gear-Cutter Teeth. This is really a description of the method of use, and advantages in using, the screw-thread comparator. This has been very widely described in the trade journals, and is now in fairly wide use. In this particular article the methods with various kinds of gears, screws, other threads and gear cutters are described, also the fixtures used in holding the work. RALPH E. FLANDERS, *Machinery*, 6-22, 2800 w. MAH.

Great Accuracy Developed in Gear Tooth Form. In this instalment on gear teeth, the author takes up the mortice tooth and tells of the now obsolete wooden inserted teeth, of the modern accurately cut forms, of the still more modern die cast teeth, and of those which may be used as cast without machining. In this article he goes into die casting, gear molds, foundry practice in gear casting, etc. CHESTER B. HAMILTON, *Can. Machinery*, 5-11-22, 3300 w. MAH.



Designer's shorthand symbols for machine tool design.—*(Mechanical Engineering.)*

Geometric Control of Gear Cutter Movement. Author points out advantages and disadvantages of Sellers, Fellows, Brown & Sharpe and Stub systems, and methods of cutting gears. Careful grinding of cutters is necessary to maintain proper shape, method of using the end mill type of cutter, special machines which are used for cutting double helical gears, reciprocating cutters, template control of cutters, range of cutters on formed tool and template work, the odontograph method, others. CHESTER B. HAMILTON, JR., *Can. Machinery*, 6-1-22, 2700 w. MAH.

Handling Materials in the Shop. A brief résumé of several papers on material-handling in Worcester, Mass., plants. One describes the methods which have been adopted with great success by the Wyman-Gordon Co., drop forge manufacturers. In this new plant, storage battery trucks move loaded steel racks upon which the cut lengths of bar stock have been placed to the forging furnaces. Similar racks are used throughout. Another describes methods of the Morgan Construction Co., which approximates a jobbing shop, in that the product is all custom made, designed to order, and consequently very diverse in character. All the equipment in this plant is of a usual nature, the only unusual thing being the location and capacities of the various cranes, hoists and trucks. *Iron Age*, 5-11-22, 2300 w. MAH.

Idle Machinery and Mill. Problem of stopping mill for long period of time is one which calls for expert treatment. List of 14 things which should be done is given. Include protection against fire, dust, waste, pests, care of belting, cleaning of machinery, etc. H. D. MARTIN, *Textile Colorist*, 6-22, 1000 w. CJW.

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Tin Industry Greatly Overequipped

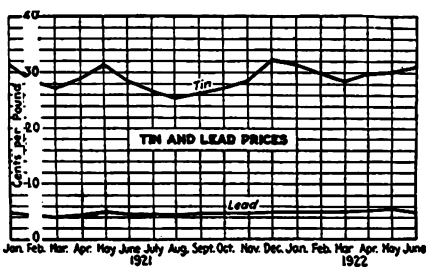
THE tin smelting capacity of the world is more than is necessary to take care of the ore production at present, which would seem to indicate that when consumption increases so that more ore is mined, overhead costs will be greatly reduced. According to statistics recently published in *Brass World,* the annual smelting capacity of all countries is 175,700 tons, while world tin ore production in 1919 is given as 120,261 tons. The estimates of annual smelting capacity of various countries follow: Great Britain, 33,900 tons; United States, 30,000 tons; Chile, 12,000 tons; Australia, 4700 tons; China and Hongkong, 7000 tons; Straits Settlements, 58,000 tons; Dutch East Indies, 16,000 tons; South Africa, 1000 tons; Canada, 800 tons; Germany, 12,000 tons; France, 300 tons. Smelting capacity increased during the war as the result of the erection of new smelters in the United States, South Africa, Chile and Bolivia and enlarged capacity in the United Kingdom and the Straits Settlements. But during the war period there was a general decline in tin ore production. It is estimated that the world's output of tin ore was 133,215 tons in 1913 and 120,261 tons in 1919. The British Empire's production was 53% of the total in 1913 and 46% in 1919; shortage of labor accounted in part for the decrease. The Empire produced 445,967 tons in the 1913-1919 period compared to 435,868 tons produced by the rest of the world.

Stripping Coal. Operators in Missouri fields strip beds wherever cover does not exceed one foot for every inch of coal. Two methods used, which may be termed advancing (work started near tipple and extended away from it) and retreating. Former preferred. Overburden usually 12 to 25 feet. Discussion, with diagrams, of methods used for disposing of dirt. Involves much loss of coal. About ⅜ of coal already mined. W. W. WEIGEL, *Coal Age,* 6-29-22, 1800 w. CJW.

Stripping Coal in Russia. Interesting description of this work, with difficulties occasioned by low temperatures. Overburden must be loosened by explosives. Both men and machines must be carefully protected against intense cold. *Coal Age,* 6-15-22, 1400 w. CJW.

Coal-mining companies are rapidly substituting permissible explosives for other classes of high explosives and for black blasting powder. By so doing they are rendering valuable aid to the nation-wide effort to make mining a safer occupation for the 750,000 men employed in American coal mines. In 1912, just ten years ago, only 8% of the explosives used at coal mines was of the permissible class; in 1921 the percentage had increased to 18; and in March, 1922, it was 21. The steadily increasing rate of use of permissible explosives is shown by the following percentages: 1912, 8.03; 1913, 9.44; 1914, 8.88; 1915, 10.32; 1916, 11.84; 1917, 11.08; 1918, 13.08; 1919, 15.21; 1920, 14.96; 1921, 17.90; March 1922, 20.80.—*Bureau of Mines Bull.*

Mine Ventilation. Problem consisted in evolution of carbon dioxide and hydrogen sulphide from silver mine near Rico, Col. Gas contained as high as 40% dioxide. To migitate almost impossible working conditions, perforated wooden pipes were placed along floor, near end of crosscut adit and in drift and an exhauster was used to draw gas to surface. Most effective when gas was least disturbed. Hydrogen sulphide probably did not exceed 0.01% but caused more annoyance than carbon dioxide. This is blamed for effect upon vision, noticeable after coming to surface; long exposure resulted in temporary loss of vision. C. N. SCHUETTE, *Eng. Min. J.-Press,* 7-8-22, 2000 w. CJW.



Monthly average price of tin and lead in New York market, based on returns furnished by *Engineering and Mining Journal-Press.*

Explosions. Coal dust cause of many explosions. Account of research work on this subject. No practical method has been found to arrest violent dust explosion in dry and dusty mine. Therefore preventive measures are essential—include humidifying air currents by water sprays and water zones. Inoculating air currents with stone and stone dust. Zones. Other preventive measures given. Care should be taken to limit charge of explosive to conform to standards set by testing stations. ALEX. MCEACHERN, *Canadian Mining J.,* 6-23-22, 2000 w. CJW.

Mine Elevators. Certain classes of mine hoisting could be performed satisfactorily by modern electric elevator if it were modified to suit mining conditions. In large, deep mines elevators can be used only for hoisting men; at smaller operations combination freight and passenger elevator can be used for handling men, supplies, and rock between surface and underground workings; in shallow mines of small capacity freight elevator can profitably replace ordinary hoist, performing all of its duties, even to raising of coal. CHARLES M. MEANS, *Coal Age,* 6-22-22, 1000 w. CJW.

Purchased Power. Brief review of development of mine power situation. Principal advantages in having power plant located at mine are: entire operation under control of management, mechanics and electricians of company can operate and maintain plant with little additional cost, fewer losses of operating time due to power interruption, power cost in many cases are less than cost of purchased power, no primary charge each month. Mine plants should be self-contained. Alternating current may be solution of transmission problems. By planning equipment used in mine fairly uniform load for at least 16 hrs. may be provided. C. W. SMITH, *Coal Age,* 7-6-22, 2500 w. CJW.

Coal-Loading Shovel Operations. Radius for curves should not be less than 20 ft. Room necks and crosscuts should be turned off at 60°, thus making it possible to lay easier curves and enabling machine to reach all coal that is to be loaded at any one time. Diagrams illustrate various layouts. WM. WHALEY, *Coal Age,* 7-20-22, 750 w. CJW.

Welding at Mine and Mill. Permanent welding shop for large mine or mill. Gives layout. Necessity for such a shop. Value other than merely repairing. Build pipe lines, tanks, vats, machinery guards, window gratings, upkeep of rail, car and cable equipment, upkeep of tools, building up of weak parts, etc. Layout is also given for oxy-acetylene shop for small mine or mill. *Acetylene J.,* 5-22, 1800 w. APS.

Divining Rods. No matter why divining rods operate in hands of honest men, there is no question of their utter unreliability as locators of undiscovered substances. General discussion of use and causes of their so-called action, which is attributed to fact that subconscious mind of operator plays tricks on him. He unconsciously observes certain surface features associated in his mind with deposits of substances sought and action of instrument is unconscious response to such suggestions. G. M. BUTLER, *Arizona Mining J.,* 6-1-22, 1500. CJW.

The mineral production of New South Wales, Australia, during 1921 was valued at £14,018,648, or an increase of £2,607,186 as compared with the previous year. The 1921 output has been exceeded only in 1916, when the value was £14,419,358.—*Pacific Ports.*

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United States Oil Reserves—9,150,000,000 Barrels

THAT oil reserves in the United States will last for the next 75 years is predicted by a writer in *Oildom*. He believes that the solution of the oil problem in this country does not lie in the discovery and substitution of some vegetable product, such as alcohol, but in the production of liquid hydrocarbons as byproducts of the better use of our coals, and the successful distillation of American oil shales.

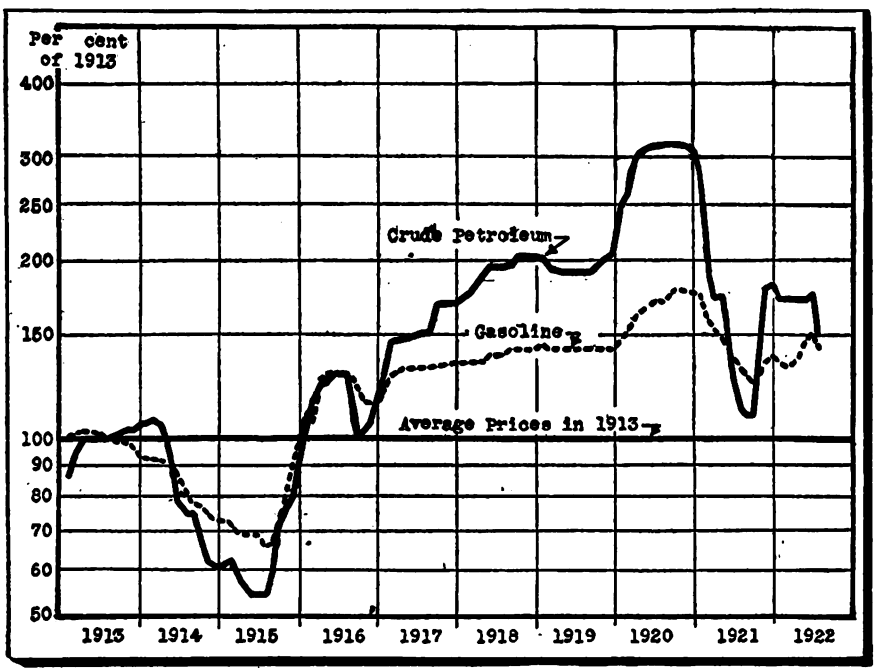
Estimates of the oil reserves of the United States, said to be based upon more complete data than any previously prepared for any country, show a total of 9,150,000,000 barrels of oil, of which more than 4,000,000 barrels are in the heavy-oil group, including fuel oils, and 5,000,000,000 barrels in the light-oil classes. The Lima-Indiana field is credited with 40,000,000 barrels and approximately 725,000,000 barrels are believed to remain in the Appalachian States. Estimates relate to oil in the ground recoverable by present methods.

According to the foregoing estimates oil reserves of the United States were distributed January 1, 1922, as follows:

New York	100,000,000 bbls.
Pennsylvania	260,000,000 bbls.
West Virginia	200,000,000 bbls.
Ohio	190,000,000 bbls.
Indiana and Michigan	70,000,000 bbls.
Illinois	440,000,000 bbls.
Kentucky, Tennessee, No. Alabama, and northeastern Miss.	175,000,000 bbls.
Missouri, Iowa, No. Dakota, Wisconsin and Minnesota	40,000,000 bbls.
Kansas	425,000,000 bbls.
Oklahoma	1,340,000,000 bbls.
Northern Louisiana and Arkansas	525,000,000 bbls.
Texas, except Gulf coast	670,000,000 bbls.
Gulf coast, Texas, and Louisiana	2,100,000,000 bbls.
Colorado, New Mexico, and Arizona	50,000,000 bbls.
Wyoming	525,000,000 bbls.
Montana, Nebraska, and South Dakota	100,000,000 bbls.
Utah, Nevada, Oregon, Washington, and Idaho	80,000,000 bbls.
California	1,850,000,000 bbls.
Eastern Gulf coastal plain and Atlantic coast states	10,000,000 bbls.
	9,150,000,000 bbls.

Dielectric Strength of Oil. In 500 tests of this property observed breakdown voltages varied enormously in successive tests and in entirely erratic manner, by as much as 100%. Slight deterioration was noticeable after 200 tests. Using groups of 100 tests, average breakdown voltages (low-tension side, ration 580 to 1) for the successive tests were c. 95, 96, 91, 89, 86. These show slight and increasing deterioration. Probibility curve showing relation between y, number of breakdowns observed at each voltage difference x is given. Results indicate that mechanism of breakdown of oil and similar materials is materially different from that of air. J. L. R. HAYDEN and W. N. EDDY, *Eng. World*, 7-22, 1000 w. CJW.

Ramage Gasoline Process Successful. This outlines but does not go into the details of a new crude oil refining process, which is said to have proven successful, and which yields a motor spirit which in turn is 70% to 85% gasoline. It is claimed that by it, a super-gasoline, comparable to aviation quality fuel, can be recovered from ordinary crude at a cost not to exceed 7½ cents. J. B. WALDO, *Automotive Manufacturer*, 6-22, 1150 w. MAH.



Oil Prices Down to General Price Level

The price of crude petroleum has always fluctuated more violently than the price of gasoline. The present cut in prices bears some resemblance to the minor price reaction of 1916, which followed conditions somewhat similar to those which have prevailed in 1921 and the first half of 1922. These oil prices are now almost coincident with the country's wholesale price level, although the cost of producing crude petroleum has increased to a notable degree since 1913 owing to the growing necessity for deeper drilling. Index numbers of prices shown in chart above were calculated by Joseph E. Pogue from weekly quotations.

Petroleum Losses. Evaporation during storage and handling causes one of largest losses of crude petroleum between well and refinery. From two-thirds to four-fifths of this loss may be eliminated by protecting oil from free contact with air. Percentage of original value lost by evaporation is two to three times percentage of original volume lost, because fraction that escapes from crude oil is best gasoline, and its value per unit volume is 2-3 times that of crude. Maximum prevention of evaporation involves keeping mixture of air and vapor above oil at rest and as near constant temperature, whether high or low, as possible. Major part of evaporation loss, when most valuable products escape, takes place on lease when oil is still fresh. Oil is liable to evaporation loss, even after it leaves lease. Dehydration in open steaming tanks is most flagrant example of neglect of evaporation losses. Such plants should be made air-tight, with valves for regulating pressures. Overshot connections should never be used for filling tanks. Even in winter, when atmospheric temperatures are low, oil in exposed lease tanks will lose more than half what it would lose during similar storage in summer. For one who handles crude, evaporation is almost as insistent problem as it is for refiner, who handles gasoline obtained from this crude, because gasoline in natural crude will evaporate approximately one-half as rapidly as it will after being distilled and stored as pure gasoline. Increasing demand for crude oil and gasoline is making this problem more and more insistent. In future it may be considered illegal to waste oil brought to surface, as it is now considered illegal to waste it underground. Each operator should attack and solve his own problem. J. H. WIGGINS, Bulletin 200, Bureau of Mines, 1922, 115 pp. CJW.

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Four-Cent Newsprint Predicted

THE determined effort of newspapers to hold their circulation in the opinion of *Editor and Publisher* has been responsible for the increased consumption of newsprint. That advertising has practically nothing to do with this increase is indicated by a consideration of the *New York Evening Post* figures for the first five months of 1920, 1921 and 1922, which show that lineage for 1922 was only 1% higher than for 1921 and 8.5% less than for 1920. At least two-thirds of the larger consumption of paper is said to be due to the increased amount of pictures and text in the newspapers throughout the country.

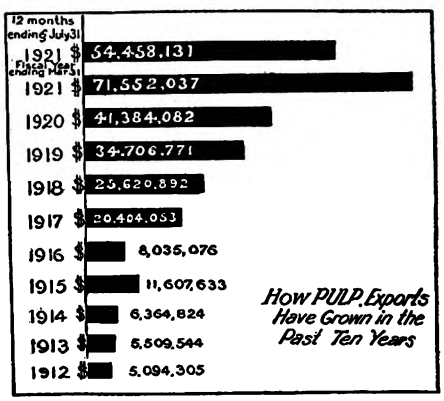
The demand for newsprint is already being reflected by a rise in market prices. Spot paper is becoming scarce and mills with a supply for immediate shipment recently quoted a price of 3.75 cent a pound, f. o. b. net to the broker. This rise in the spot market has been accompanied by the International Paper Company's announcement that its price for new orders is 3.75 cents. Although the price on newsprint from northern European mills has not been affected and this paper is still being offered at 3.65 at the pier, it is being imported in such small quantities that if consumption continues at the present rate the price of newsprint will be raised to 4 cents a pound.

Lime in Paper Manufacture. Lime used in both soda and sulphate pulp processes to recover or causticize waste liquors. Lime first slaked and then reacts with sodium carbonate to give caustic and calcium carbonate. Thorough agitation is important factor in procuring greatest efficiency from lime used. Every car should be tested for active CaO content before used. Introduction of filter press prevents loss of soda due to excessive use of lime and has also increased capacity of alkali room about 100%. Lime for causticizing purposes should contain about 90% active calcium oxide, and not over 1.25% magnesium or 1.5% silica when received at mill. Over-burning not desirable. Lime producer can assist manufacturer of pulp. G. K. SPENCE, *Paper Mill*, 6-24-22, 1750 w. CJW.

Starch in Papermaking. Starch is used in colloidal form to add to rosin size. Frequently added to beater to give strength and handle to paper and better surface finish. Completely soluble colloidal solutions of starch may be prepared which are of value in surface sizing. These solutions have successfully replaced glue and gelatin in many mills. Also compete with casein in coating book and catalog work. Use with casein should be encouraged, as a starch alone is not suitable for waterproofing paper. Used as an adhesive in combining sheets of paper for bristol boards, papeteries, etc. W. A. NIVLING, *Paper Mill*, 7-8-22, 2000 w. CJW.

Standardization. Standardization in paper industry has sevenfold application. These are standardization of raw material, processes, product, line (grade standardization), distribution, price and use. Each of these phases is briefly discussed. Danger of standardization in manufacture and distribution of goods is not that we shall overstandardize, but that we shall lose benefits and true significance of fact by light talking and no doing. R. E. RINDFUSZ, *Paper Mill*, 6-17-22, 1500 w. CJW.

Rosin Sizing. While there are conditions when high free rosin size is superior, it will generally be found that lower free rosin or even neutral size is easier to use, especially with hard water, and it has added convenience that in many cases it can be used without emulsifying. If very high free rosin size is used, good emulsifier must be used. Local conditions have important influence. Amount of size and alum vary with conditions, but there should always be very small excess of alum and in most cases alum should be added near end and never to hot stock. Free acid from any source should be avoided. Effect of heat of dryers on rosin sizing is interesting, and it may be that in future more perfect control of this factor will prove valuable. Some fillers injure sizing, and care should be selected in choosing type of filler in use and, in all cases, it is better to add filler before rosin size has been precipitated by alum. E. J. TURNER, *Paper Mill*, 1200 w. CJW.



Canada's pulp exports continue to expand.—*(Canadian Printer & Publisher.)*

Dictionary of Paper Terms. First of series of definitions of chemical, physical and technical terms of interest to paper men. *Paper Trade J.*, 6-1-22, 4 pp. CJW.

Paper Testing. Report of Committee on Paper Testing, including microscopical, chemical and physical processes with account of apparatus employed. Very complete details. *Paper Trade J.*, 7-6-22, 3500 w. (To be continued.) CJW.

Roofing Machine. General discussion of saturating and coating roofing paper. Many even fundamental problems in industry have not been settled. Many of these are pointed out. C. S. BIRD, *Paper Mill*, 6-3-22, 1600 w. CJW.

Ventilation of Machine Room. System must absorb vapor arising from paper machine without allowing it to condense in building. All air which passes out of ventilators is heated in mill. This heat must be supplied to incoming air at some point in system. Hoods distinct factor in ventilation. Cost of ventilation higher than generally supposed. Waste heat passing out of machine rooms now utilized, basis of so-called Briner economizer, which extracts heat from air passing from room and puts this heat into air going into machine room. Another method consists in drawing vapor through sprays of water which cool vapor down and heats water. J. O. Ross, *Paper Mill*, 6-3-22, 2000 w. CJW.

Sulfate Digester Linings. Backing to thickness of 1 inch of equal proportions of quartz and cement mixed with silicate of soda. Face brick, single layer of fire brick on side, giving thickness of 2.5 inches or total thickness of 3.2 inches and pointed with same cement mixture as backing. Lined digester gives yield of 14.2% less than unlined digester, or, in other words, occupies about 305 cu. ft. of digester space in digester unlined 50 ft. 4 in. by 8 ft. diameter (2150 cu. ft.). Will cook slightly faster than unlined digester with active alkali in same ratio to its cubical contents, owing to smaller loss by radiation. P. C. AUSTIN, *Paper Mill*, 6-3-22, 1000 w.

Electrical Way Sectional Paper Machine Drive. Historical discussion of development of sectional drive and description of Westinghouse equipment. Applicable to all types and speeds of paper machines from highest to lowest speeds and for any and all ranges of speed, and has been demonstrated as being satisfactory. Even in old mills where but little space is available sectional drive can be installed. Simple, flexible and adaptable. S. A. STAEGE, *Paper Mill*, 6-3-22, 2500 w. CJW.

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RUBBER · PLASTICS

New Uses for Rubber Must Be Found

DUE to the overproduction of raw rubber during recent years, the industry is handicapped by a heavy surplus which, it is believed, will not be disposed of for a long time. In some respects the current year is regarded as the worst on record from the producers' standpoint. In spite of a surplus of 310,000 tons, production has continued to increase and predictions are made that the crop for this year will equal that of 1920 when the output reached 344,000 tons. If this occurs about 65,000 tons will be added to the current surplus, bringing stocks up to 375,000 tons at the close of the year.

As a result the rubber-growing industry, which before the war yielded enormous profits to the investor, has now reversed its position. The more than $750,000 invested in the trade by almost 600 plantation producing companies is today yielding very little with slight prospects for any improvement in the near future.

It is pointed out that importations of rubber into the United States this year have been far in excess of those of 1921. According to the Rubber Association of America, total shipments of the commodity to this country for the first six months of the year amounted to 130,358 long tons against 78,712 tons in the corresponding period last year. June importations amounted to 15,750 tons against 13,477 tons in the same month in 1921.

In an effort to realize a profit on their investments, rubber producers and those interested in the industry are trying to find new channels for consumption. Some time ago a company was organized in England to experiment in the use of rubber as a paving material. But though considerable progress has been made during the past year it will be some time before the advantages of rubber roadways are demonstrated sufficiently to convince that the heavy initial outlay is justified.

Dental Rubber. Dental rubber is vulcanized at high temperature and steam pressure. The rubber that is vulcanized between two metallic surfaces is better and more durable than that which is vulcanized between plaster of Paris surfaces. The coloring of the rubber is difficult to carry out. Para rubber gives the best results. Cleanliness in manufacture is essential. All impurities, dust, etc., must be avoided; otherwise vulcanized products will be spotted. ANON., *Rubber Age*, 7-25-22. IG.

Furfural Phenol Products. Furfural is made from corn cobs and oat hulls. It can be condensed with phenol to give synthetic resins of varying properties, which can be used as a substitute for rubber, in the manufacture of varnish, etc. *India Rubber World*, 8-22. IG.

Accelerators and Rubber Mixes. Description of use of accelerators in vulcanization of rubber since first use. Mechanism of action of accelerators is also described. Chief function of accelerators is given as the reduction in time of vulcanization from two-thirds to two-fifths improvement of tensile properties and aging qualities of rubber, elimination of sulphur bloom on vulcanized products. Special accelerators are required for special results. Various accelerators have proved to be more effective under certain conditions; particular accelerating agents give particular colors. Very pale drab is obtained with accelerene. Relative efficiency of accelerators, deleterious effects of these chemicals on the health of the employees, etc., are discussed. J. L. ROSENBAUM, *India Rubber World*, 8-22. IG.

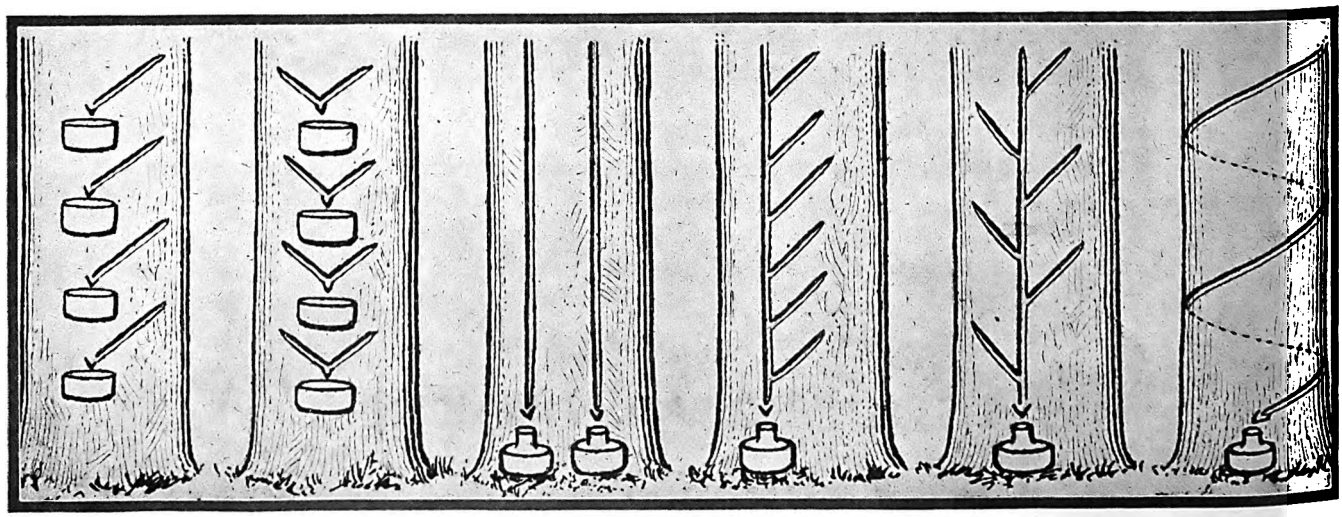
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Cut Sheet from European Standpoint. Successful making of cut sheet requires select quality of crude rubber, special machinery and expert technical skill. Very best qualities of rubber are required, and must be carefully handled. Good cut sheet is made from soft cure Para. Plantation rubber can also be used; however it must not come from a young plantation, it must be washed absolutely clean and the smoking must always be even. The various steps in the process are described. The production of marbled and striped effects is also described. J. HERRISOHN, *India Rubber World*, 8-22. IG.

Hard Molded Plastic. Short description of hard rubber and hard rubber substitutes, such as bakelite, redmanol, condensite, etc. *India Rubber World*, 8-22, IG.

A Singapore man claims to have invented a process whereby rubber can be used commercially without vulcanization.—*Tractor World.*



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Methods of Tapping for Rubber.—*(Spokesman.)*

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Production Costs the Key to Profit

THE average price of confectionery products at wholesale has been reduced to a point where it compares favorably with the average level of other commodities. Retail prices, especially in higher priced lines, will probably be lowered, and as a result profits will depend to a great extent upon reducing production costs.

Although costs in the confectionery industry have been comparatively low, raw materials have recently shown a tendency to advance in price. This has been especially true in the case of sugar. The total consumption of sugar for 1922 was reported to be 4,266,775 tons, compared to 4,058,244 tons in 1920, and 4,126,673 tons in 1919—an increase over last year of 208,531 tons and over 1919, the year of the highest previous record, 140,102 tons.

While an actual sugar shortage is not anticipated there is no prospect of a decrease in sugar prices, and any reductions in costs during the balance of the year in the confectionery industry must be the result of increased economies in operation.

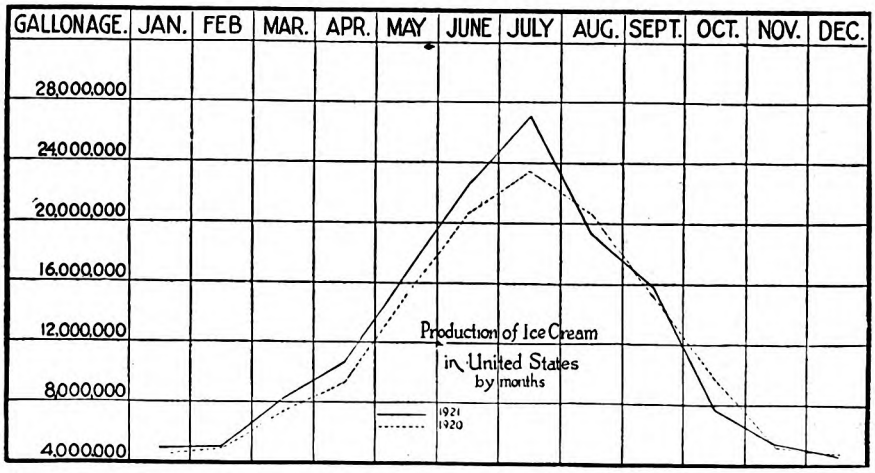
Absorption of Water by Sugars. When tested in 60% humidity (atmospheric) starch showed greatest moisture absorptive power during first hour. Next in order came cellulose and agar. Levulose, considered by many most hygroscopic of carbohydrates, was eleventh on list. Lowest values were shown by dextrose, mannitol and sucrose. In saturated atmosphere, however, levulose containing materials showed highest, mannitol lowest absorptive power. When samples were allowed to come to equilibrium under ordinary atmospheric conditions after exposure to 100% humidity, all lost moisture except lactose and raffinose, which showed slight gain for many months. Sugars which absorbed moisture in excess of monohydrate form lost moisture to point of monohydrate. Sucrose continued to lose moisture during period of two years. No fixed relationship could be established between percentage humidity and moisture content, owing to rapidity of atmospheric fluctuations and lag of absorptive power of each material. C. A. Browne, *J. Ind. Eng. Chem.*, 8-22, 3000 w. CJW.

Condensation in Sugar Factories. Modern condensing plant consists of individual barometric condensers for each evaporator and vacuum pan, central dry vacuum pump and central water injection pump, except where water supply comes within reach of condensers. Condensers should be placed as near effects which they serve as possible. Velocity of vapors should not exceed 250 ft. per second. Water supply should be served from header or manifold about 15 ft. below water inlets to condensers and directly connected to discharge pipe of injection pump, completing closed circuit. Advantages of this circuit. Defence of central vacuum pump. Volumetric contents of condensers and pumps problem for each mill. R. H. Womack, *Sugar*, 7-22, 750 w. CJW.

Turbine in Sugar Factories. General discussion of the installation of turbines. Small sets usually of sturdy design, are shipped completely assembled and are not difficult to place on foundations. Medium sized turbines, 150 to 2000 kw., are more delicate, may be shipped assembled, but require special attention as to installation. Alignment must be carefully checked, usually by leveling bedplate. Other methods discussed. Planning the work so that erecting man may give all his time to work in hand. *Sugar*, 7-22, 1800 w. CJW.

Ice Cream. Survey of questionnaire on mixing, freezing and hardening. Majority pasteurize, usually after all products are added. About 40% test for acidity, best acidity being about 25%. Gelatin usually added in solution. Vanilla generally added to whole mix and other flavors added to each batch. About half manufacturers use improvers. Majority use homogenizer, viscolizer or emulsor. Pressure and temperature at which mix is homogenized vary greatly. With improver mix usually aged two to 12 hours, and without, from 18 to 48 hours. Average temperature during ageing is 40°. Mix goes to freezer at temperature it leaves ageing vat. In freezing majority prefer 8-10°. Average length of time of freezing is 15 minutes. Fruits or fruit flavors require slightly longer. Hardening rooms maintained at 0 to 10°. Average length of hardening was 18 hours. Cork board common insulation used. Use of ice machines for refrigerating hardening room is almost universal. Only few use ceiling coils only. *Ice Cream Rev.*, 6-22, 1200 w. CJW.

Condensed Ice Cream Mix. Uniformly prepared ice cream mix may be made by condensation process, using milk, butter or cream, sugar and gelatine. The condensed mix is easily standardized to uniform composition by having butter fat, milk solids—not fat, sugar and gelatin in the proper proportions before condensing. A definite yield is thus obtained. It is possible so to work that the mix will contain a very small number of bacteria. The number of bacteria in the mix as it comes from the pan will approximate number that will be in frozen product, providing ordinary care is taken. Mix will keep for two to three weeks, when stored at 32-35° F. R. W. Peterson and P. H. Tracy, *Ice Cream Trade J.*, 7-22, 2000 w. CJW.



Production of ice cream in the U. S. by months in 1920 and 1921, showing the annual production cycle. (U. S. Bureau of Market Reports, in *Ice Cream Trade Jour.*)

Edible Gelatin. To be edible gelatin must not contain zinc in excess of 100, copper in excess of 30 or arsenic in excess of 1.4 parts per million. Bacteria must not be present in excessive amounts and *B. Coli* must be absent. Odor and taste should be free of objection and remain so after putting into solution and allowing to stand at room temperature for 48 hrs. Standards could probably be raised 100% without creating even a ripple of attention by reputable gelatin manufacturers in America. Methods are given for determining gelatin values. R. H. Bogue, *Candy Manufacturer*, 7-22, 1200 w. CJW.

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Railroad Equipment Purchases Increasing

THE orders placed by the railroads for cars and new equipment in the first half of the current year indicate, perhaps better than anything else, that business throughout the country is improving. According to *Railway and Locomotive Engineering*, the railroads have placed orders for 77,053 freight cars, 1,195 passenger cars and 460 locomotives. These combined purchases are larger than they have been for the past few years and the orders for new freight cars are in excess of those placed in the first five months of any year since 1912.

In 1916 the orders placed for the first six months of the year amounted to only 49,551 cars. In 1917 the total year's purchases of freight cars was 79,367, and 22,062 in 1919. In 1920, 84,207 were ordered for domestic use, and in 1921 only 23,346.

Orders for new locomotives during the current year have not been as numerous in comparison with other years as have those for other kinds of rolling stock. The 460 locomotives ordered since January 1 compare with 1,315 for the first five months in 1916, which was the best year since 1913.

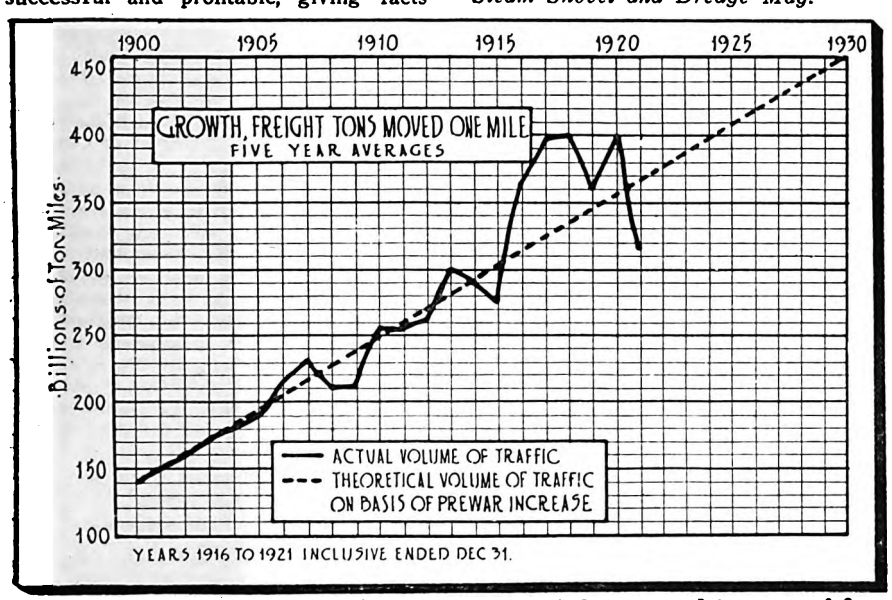
Highway Research Brings Economic Transportation. The director of the advisory board on highway research, National Research Council, says that proper road location reduces construction and operating costs, and that this location can be determined by research now proceeding on subsoils. Also that costs can be reduced by maintenance studies now in progress, and through study of construction methods. Everywhere proper research is needed to prevent spending too much money on highways or spending it wrongly because of lack of knowledge. W. K. HATT, *Automotive Industries*, 6-8-22, 3800 w. MAH.

Motor Transport for Railways. The strong point is made by this author that electric railroad operators are in the business of selling transportation, and should sell that form which is sold at the greatest profit on the one hand, or sold most easily on the other. He then argues that transport on rubber is no more difficult to handle than on rails, and that electric railway men should look at it in this way. This would mean their use of motor buses as feeders or in place of certain trolley units which have proven unprofitable or unpopular, or both. Cites cases in which this policy has been successful and profitable, giving facts and figures of these. ZENAS W. CARTER, *Power Wagon*, 7-22, 4700 w. MAH.

Inland Waterways Freight Terminals. Inland freight terminals should be so designed that transference and transshipment of freight should be by one rapid mechanical movement. This should include lifting and depositing without rehandling by manual labor, between vessel and shore. By same machinery, transshipment between vessels berthed at terminal should be possible. Description of equipment given. H. McL. HARDING, *Eng. World*, 7-22, 1500 w. CS.

Lubricating Steam Engine Bearings. Wide variety of conditions is found in lubricating steam engine bearings. Bearings may be lubricated by a squirt can, drip cup, manifold reservoir, ring oiler, splash system, gravity of force feed. Formation of oil film on bearing is dependent on speed of engine, load per square inch, bearing clearances, oil grooves, quantity of oil supplied and various other factors. W. F. OSBORNE, *Power*, 7-11-22. 1,500 w. IG.

More than twice as many women were following transportation pursuits in 1920 as in 1910 in New York.—*Steam Shovel and Dredge Mag.*



The growth of freight tons moved one mile in the U. S., expressed in terms of five-year averages, 1900-1921.—*(Magazine of Wall Street.)*

Refrigerator Cars. Efficient and economical railway refrigerator car is one which provides adequate air circulation, adequate protection to lading, adequate quantity and degree of refrigeration, quick initial cooling, uniform temperature, dry air, space to permit proper methods of loading and good car construction to minimize maintenance and increase time in service. Résumé of literature, including some of most interesting and important facts regarding principles and methods involved in operation as well as regarding types of cars and methods of construction. Very great improvement has been made within last few years. Indications are, however, that subject of refrigeration in transit is not appreciated in some quarters as it should be. Very important to owners of cars as well as owners of contents. Table showing thermal conductivity of insulating materials. Illustrations of construction. W. H. WINTERROWD, *Mechanical Eng.*, 7-22, 5000 w. CJW.

Electrical Porcelain. Discussion of modern handling methods in manufacturing operations. Machinery used in unloading clay from cars, in handling press cake into and out of drier and to crusher, handling clay through crusher, tempering bed, dust mill and screen, handling dust to press room and unfired products of presses into and out of driers and to saggers and handling saggers to kilns, out of kilns and to packing room. Study of apparatus used and economies effected. In loading kiln, for example, clear saving of 80% was realized by use of conveyor, while in unloading kiln saving of 50% of labor cost was made. G. L. MONTGOMERY, *Chem. Met. Eng.*, 7-12-22, 2000 w. CJW.

A new system of transporting logs by using wooden rails and rubber wheels provided with a guide has been invented by a Swedish engineer, who has patented his invention in the United States—*So. Lumber Jour.*

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Crop Report Causes Price Advance

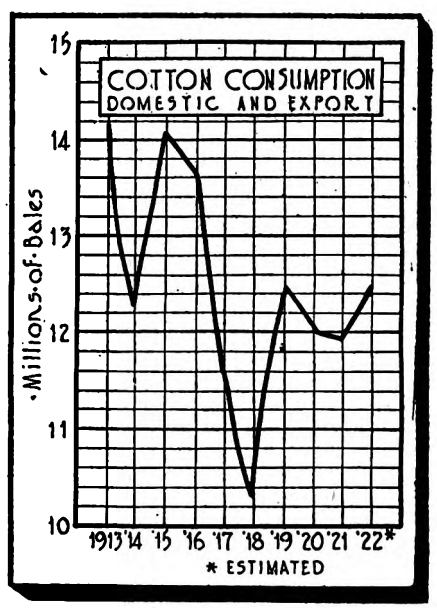
ALTHOUGH cotton prices advanced $8.75 a bale following the publication of the Government's report which placed the condition of the crop at 70.8 and the indicated yield at 11,449,000 bales, there appears to be considerable skepticism in regard to the accuracy of the report. The cotton goods trade is not ready to accept the report as the controlling factor in merchandising for the future. Neither has the report brought in the outside speculative public as a buyer. It is believed that the extent of the drouth in Texas is becoming one of the most important factors of the general situation, and that the condition of the crop in that State will furnish a clue to the future course of prices. Moreover, less attention is being paid to the condition figures in the recent Government report than to the crop estimate, which showed an increase from the figures of the last previous report of 11,065,000 to 11,449,000 bales—a gain of nearly 400,000 bales. The estimated yield is 3,500,000 bales larger than the crop of last season. It points to a season's supply with 4,900,000 carryover of 16,350,000 bales. It is pointed out that the last weekly Government report and several similar reports preceding it have taken some of the sting out of the monthly statement.

Bleaching of Cotton Piece Goods. Continued article. Impossible to obtain even strength of bleaching solution by use of Twaddel hydrometer. Solutions should be titrated, first with arsenious with starch iodide paper as indicator. Titration, for which directions are given, is carried out by workmen in charge of chemic pit. Bleaching solution piped from large mixing and storage tanks to bleach house. Usual method is to pass fabric from washing machine into chemicing tank by overhead winces. Chemical solution sprayed on piled fabric, drained through it, pumped up and again sprayed onto goods. Excess chlorine must be removed, which is accomplished by use of sulfuric acid, 1 to 2° Tw. Other anti-chlors are sodium hyposulfite and sodium bisulfite. Bleaching with hydrogen peroxide is practically prohibitive, because of cost. Sodium peroxide and perborate may be used. Quality of bleach determined from tensile strength of goods before and after bleach, percentage of fatty matter (0.11% to 0.78% after bleach), ash, which should not exceed 0.1%, oxycellulose, which should be absent. WM. A. BAILEY, *Canadian Dyer & Color User*, 7-22, 1200 w. CJW.

Merrowing Operations. Means of placing ornamental finish on edges of fabrics in underwear and hosiery trades. Shell stitch machine has straight needle which works in conjunction with latch hook similar to that used in knitting industry. Supplemental thread carrier for introducing extra thread of another color is very unique feature. Possible to use mercerized cotton for body of shell and supplement pearl or edge with art silk. Various other machines easily adapted to produce great variety of finish on edges of various fabrics. *Textile American*, 7-22, 500 w. CJW.

Triple Vertical Openers. Opening and cleaning effect obtained by passing stock over grid surface by means of steel picks or fingers attached to discs on vertical shaft. No beating action and no possibility of fiber being injured. New type developed, which is of uniform section throughout its length; 120 bars in 4 sections of 30 bars each with equal spaces between, so that 15 bars run off the elements of one cone in direction of rotation of cylinder and 15 bars in contrary direction. Means of adjustment provided, and it is possible to obtain differential adjustment, opening wide first set which cotton strikes and gradually closing sets which follow. Results of tests reported. *Cotton*, 7-22, 1500 w. CJW.

Roller Drafting. Arrangement of drafts throughout mill factor of paramount importance, for upon the arrangement depends possibility of producing yarn that will be up to required standard of quality and strength. Several factors must be considered, such as class of cotton, counts of yarn, class of yarn and number of machines. Maximum draft that can be applied at each machine is controlled, to large extent, by length of staple. Successful drafting can only accrue when majority of fibers contained in material are under control of drawing roller for longer length of time and given roller speed. Thus long stapled cottons can be subjected to higher drafts than short-stapled cotton. Regularity of staple, and nature of fibers also affect operation. Higher drafts may be used with double rovings. *Southern Textile Bul.*, 6-29-22, 1200 w. CJW.



Cotton consumption in the U. S. since 1913.—*(Magazine of Wall Street.)*

Covering Vegetable Fiber in Wools. Removal of small quantities of burrs or cotton may be effected by previously carbonizing goods or by burling after dyeing. Latter troublesome process and involves risk of damage to cloth. May be dyed to approximate color of dyed material by burl dyeing or inking (speck dyeing). Dyes soluble in methylated spirits used. Sumac and iron has been and still is largely used. Cloth is inclined to become somewhat harsh in handle and wool is not left as clear as might be desired. Logwood also used and while considered satisfactory, results were inclined to be lacking in depth. Colored burl dyes were only rarely employed. Use of direct cotton dyes provides means of obtaining full range of dyes so that one can dye specks identical shade with bulk of material. Operation may be readily carried out in washing machine or even in milling machine. Concentration of dye plays important part in obtaining consistent and satisfactory results. Dyes specially recommended are given. Production of solid shades on woolen goods containing appreciable quantity of cotton may be accomplished by dyeing material in neutral dye liquor plus salt with direct cotton colors, or by using tow-bath method, wool being dyed with ordinary acid colors, very easily leveling acid colors, chrome colors, etc., and cotton filled up as in case of burl dyeing on washing machine. W. E. SANDERSON, *Am. Dyestuff Reporter*, 7-17-22, 3000 w. CJW.

Protectol. New German preparations which protect animal substances, such as wool, silk, leather, furs or human skin, against injurious effect of alkalis. Addition of protectol to wool scouring bath makes it possible to keep temperature above melting point of wool fat without danger to material properties of fiber. Used with advantage in scouring of piece goods, both all wool and, more especially, unions. Obvious application is in dyeing of wool with vat dyes in hydrosulfite-caustic vat. By using protectol in dyeing of union piece goods with sulfide colors wool is only slightly stained and may be afterwards cross dyed with acid, metachrome or after-chroming dyes. Protectol enables rapid and safe degumming of raw silk in caustic alkaline bath without slightest risk of damage to fiber and with great saving in

steam and labor. Satisfactory results have also been obtained in treatment of furs, when used with "killing" liquors, and in liming of hides. Also used in dyeing leather with sulfide dyes. ALFRED EDGE, *Am. Dyestuff Reporter*, 7-17-22, 1500 w. CJW.

Efficiency in Worsted Dyehouse. Poor ventilation is one of the grave defects connected with most dyehouses. Detrimental from point of view of health as well as from technical side. Atmosphere of steam caused by sheer waste. Temperature should be controlled scientifically. Efficient supervision of labor important. Number of foremen who understand language of workmen. With efficient foremen dyer always has efficient help. Hard water costs many mills thousands of dollars annually due to wastage of soap and to incomplete cleansing of goods. Efficient results obtained only when soft water is used. Closest sort of cooperation must exist between wet finisher and dyer. Rinsing can never be hurried. The rinse should take twice the time of the scour. Dyeing hopeless task unless goods are scoured, rinsed and carbonized properly. Inspection of kettles and accessory machinery important. (To be concluded.) *Am. Dyestuff Reporter*, 7-17-22, 3000 w. CJW.

Artificial Silk. Discussion of the four varieties of silk: viscose, cuprammonium, Chardonet and acetate. First named made in largest amounts. Artificial silk being used for all varieties of knitted materials and with other fibers for woven fabrics from finest gauzes to heavy tapestry. Also used for fancy materials such as braids and trimmings. Dyestuffs and dye methods for first three types are same as for cotton. Differences in dyeing properties pointed out. Acetate silk shows entirely different properties from others, due to different composition. Dyes directly with basic dyes and with direct cotton dyes after partial saponification. All artificial silks are more lustrous than real silk. Also possible to spin this silk as fine as 0.7s denier per filament, finer than real silk. P. E. KING, *Southern Textile Bull.*, 7-13-22, 1500 w. CJW.

Bleaching and Dyeing Jute. First oiled with 25% to 30% of oil emulsion from mineral or fish oils. In bleaching, first boiled with soda ash or soap to remove gums and then treated with Javelle water. The yarn is treated with 1° Tw. chloride of lime solution at 80-90° F. for 1 hr. Jute cloth is usually bleached with sodium hypochlorite. Jute may be dyed with neutral or weakly acid bath. Basic dyes are applied directly in neutral bath. Soft water should be used. The eosines are used in very "short" bath. Formulas are given for various dyes and types of baths. Examples are also given illustrating methods of printing jute with acid, basic and substantive colors. E. DUEHN, *Canadian Textile J.*, 6-6-22, 2000 w. CJW.

Streaky Dyeing on Serge. Cause located in scouring of goods. Proper formula was used, but cold water in an indefinite amount was introduced into washer thus reducing strength of alkali in such a way that the soap worked in streaks. Resulted in streaky dyeing. DAVID WELSH, *Textile World*, 7-29-22, 1000 w. CJW.

Wet Cleaning and Bleaching. Considerable part of white work washing may be accomplished without bleaching. Use of soda for white work, except for heavy goods and blankets, should be avoided, unless its nature is understood. Borax is best form of alkali for preparing alkali bath in washing processes on white silk and wool fabrics. Brushing should be avoided on most white work. Method of handling work in baths of great importance. Discussion of sodium perborate, potassium permanganate and oxalic acid wet bleach. ROY DENNEY, *National Cleaner & Dyer*, 8-22, 2000 w. CJW.

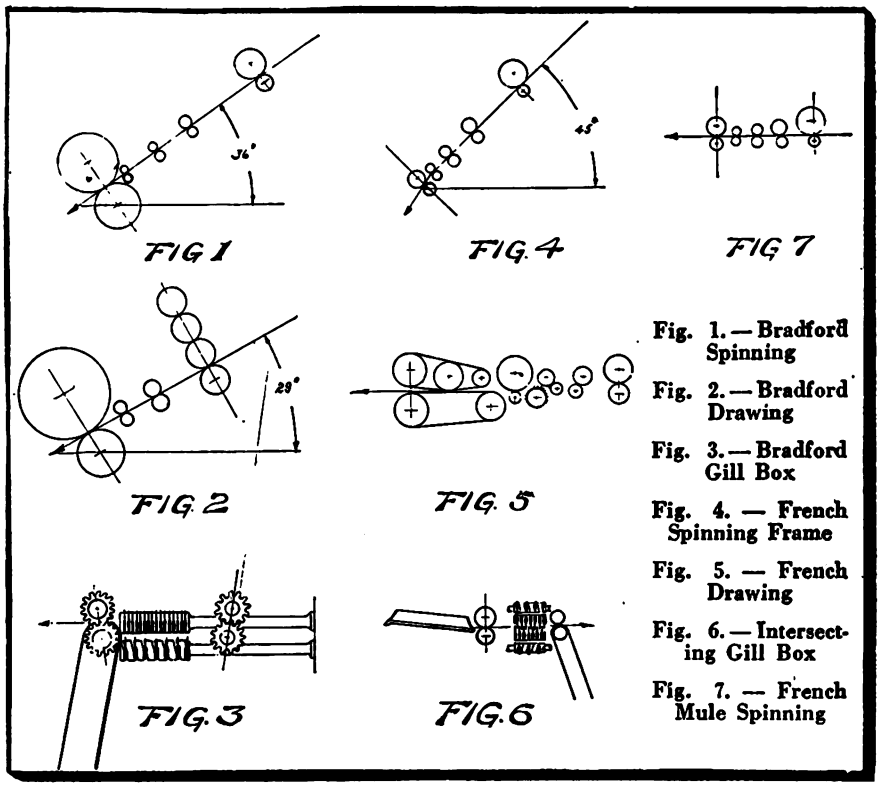
Constructional Materials in Dye House. With wood necessary to have vessel for each color. Cement serves as admirable lining for vats to be used with lime or chlorine bleaching, which do not require extreme changes of temperature. Copper has found its greatest application among woolen and silk dyers. Danger lies in formation of verdigris. In cotton field limited because of action of copper on certain of direct cotton colors, and wholly unsuited for sulfur colors. Lead has very decided weakness, because of effect of heat which causes expansion and results in ridge or fold. Find extensive use in peroxide bleaching. Monel metal is best alloy. H. GRANDAGE and W. E. HADLEY, *Am. Dyestuff Reporter*, 7-17-22, 750 w. CJW.

Hydro Extractors. Cause of many extractor difficulties are traced to: personal element, basket deterioration, neglect, improper loading, defective materials, fatigued materials, excessive speed, ignorance. Discussion of these factors. HARRY N. STEPHENS, *Cotton; Am. Dyestuff, Reporter*, 6-19-22, 1200 w. CJW.

Worsted Drawing Machinery. Comparison of the new French with the Bradford system. Illustrated in cut. Fig. 1 shows impossibility of close setting in Bradford system. Fig. 1 indicates smaller rolls on French worsted spinning machine, distance between nip of front carrier and nip of front rolls being less then half distance on ordinary Bradford spinning frame. Comparison of number of operations. Wrench system has advantage, for on it may be produced good yarns from stock too short to be spun efficiently on Bradford system. A. S. NEILSON, *Textile World*, 7-8-22, 1600 w. CJW.

Outlook for Cordage. Survey of recent tendencies and analysis of present manufacturing and trade conditions. Present indications point to return of price levels to stable bases, increase in orders at mills and increase in mill activity, decrease in stocks of raw materials and increased business throughout country that will inevitably be reflected in cordage industry. W. S. HAYWARD, *Cord Age*, 5-22, 2000 w., charts. CJW.

Management Applied to Textile Plants. General discussion of the relationship of management to labor, and executives to each other. The relative development of mills in the South and North and comparison of labor, transportation and other costs. GEORGE S. HARRIS, *Cotton*, 5-22, 2500 w. APS.



Comparison of new French with Bradford system of worsted drawing machinery. See "Worsted Drawing Machinery" digest.

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Our Dyestuff Industry

(*From page 1409*)

plished by Germany by reason of her advanced position in chemical manufacture. This is a great question for the Senate to decide at this time. The only harm that will come from a dye embargo is to the German industries—the German cartel that furnished Germany with all her chemicals and ammunition during the war. If we make a mistake now and lift this embargo, it may destroy, and probably will destroy, this great industry, which was created during the war by the men of energy and genius who had the courage and the ability quickly to provide our armies with the necessary materials with which to meet the onslaught of Germany."

The fight for the dye embargo is not yet over. When the result of the Senate's vote was announced Dr. Charles H. Herty, president of the Synthetic Organic Chemical Manufacturers' Association, declared that the struggle will be renewed, under the leadership of Senator Frelinghuysen, when the proposal is brought up on the floor of the Senate as an amendment to the tariff bill.

The dye interests can see a connection between the defeat of the embargo provision and the Government's action against the Chemical Foundation in the matter of the German patents. The timely "exposé" of the Chemical Foundation, they say, was maneuvered by the German interests in order to frighten Senators into opposing the embargo. It is a fact that certain Senators who had been expected to support the dye licensing feature of the tariff bill unexpectedly turned against it, but the statements that they were influenced by the action against the Foundation, and that, further, the action against the foundation was occasioned by German interests, are based, of course, on pure assumption. *Drug & Chemical Markets* makes the assumption, saying:

"The dye license is not dead, as has been pointed out by Senator McCumber, chairman of the Senate Finance Committee, for it is believed that by the time the measure comes up for discussion on the floor of the Senate again, the stampeded members will have appreciated the trick of which they were more or less an innocent part. They were tricked, —purely and simply fooled—not by the "American dye trust," the myth of politicians and the unknowing, but by the opponents of the dye license measure, who engineered one of the cleverest stunts seen in a long time in political Washington, to influence the vote on a measure being considered by a congressional body. With the passing of the confusion between the dye license proviso and the Chemical Foundation patent muddle, it is expected by the leaders that the Senators who bolted at the last minute, will very probably again take their stand with those who stood fast in an effort to keep an adequate dye and chemical industry in the United States.

The fuss over the Chemical Foundation is the result, in the last analysis, of a trade practice employed by the German coal-tar chemical trust as a means of insuring its supremacy. During the period before the war, when the German industry was being developed, the German manufacturers took out American patents on their processes and their products. These patents were never worked in the United States, but they prevented American chemists from taking out similar patents and from engaging in the industry.

When the United States entered the war the Alien Property Custodian was authorized by Congress to seize alien properties, among which were these dye patents owned by Germans. Later the Custodian was authorized to sell the alien properties. There was no Government agency in existence to which the patents could be turned over, and the Wilson Administration did not wish to sell the patents to private individuals. Accordingly the Chemical Foundation, Inc., was formed, and 4700 patents were sold to it for $250,000. Mr. Garvan, who had been Alien Property Custodian, became president of the Foundation, without salary.

The Chemical Foundation then proceeded to issue licenses to the trade for the use of the patents. These patents, it has been pointed out, are not practical formulæ for the manufacture of the products they cover. If a chemist were to follow some of the formulæ literally he would possibly be blown up. It was necessary, therefore, for the chemical manufacturers to spend thousands of dollars for research before they could go to work under the licenses issued by the Foundation. The licenses are necessary, however, for without them it would be illegal to market the products covered by the patents.

The present difficulty between the Foundation and the Administration began when the Foundation filed suit for the recovery of funds paid to the Federal Trade Commission for licenses issued under the patents before they were sold to the Foundation. This money was paid to the Federal Trade Commission under the Trading with the Enemy Act, which provided that the funds be held in the United States Treasury as a trust fund for both the owner of the patents and the licenses, to be paid eventually as might be decided as the result of a suit to be brought by the owner of the patents. The Foundation, as the owner of the patents, brought suit, in accordance with the Trading with the Enemy Act. Its lawyers found that the Treasurer of the United States would have to be named as co-defendant.

A storm, totally unexpected by the Foundation, was stirred up by the initiation of this suit. President Harding started the fireworks by writing to Col. Thomas W. Miller, the Alien Property Custodian.

"My attention has been called by the Department of Justice," wrote the President, "that a corporation known as the Chemical Foundation has brought suit against the Treasurer of the United States for an accounting alleged to be due on royalties for the use of certain patents sold to the Chemical Foundation by the Alien Property Custodian during the previous Administration. On the face of such an action it became so apparent to me that an inquiry should be made, that I asked for a report by the Department of Justice on the sale of this enemy property to the Chemical Foundation. It appears that the sale was made at so nearly a nominal sum that there is reason to believe that this Government has not faithfully observed the trust which was implied in the seizure of this property. The circumstances relating to the entire transaction are of such a character that full investigation becomes a public duty. Moreover I feel that your office is obligated to maintain the sacred character of the trust to which the Alien Property Custodian is committed by the laws.

"You are therefore directed to forthwith proceed as follows: Make written demand upon the Chemical Foundation, Inc., in form to be approved by the Attorney General, to immediately return, transfer and assign to the Alien Property Custodian, all patents, trademarks, copyrights, contracts, applications or other properties or rights transferred to it by the Alien Property Custodian as aforesaid, and to account to you for any and all rents, profits, license fees, or other proceeds thereof realized by said Chemical Foundation, Inc., from said properties, or rights or any of them from the date of transfer thereof to the Chemical Foundation, Inc., to the date of restitution."

Several editors have caustically remarked that it took a very long time for the President to discover these facts,—which would have been apparent even in 1918. However, in obedience to the President, the Department of Justice instituted Grand Jury proceedings against the Foundation. Hearings are now taking place. At the same time Col. Miller served his demand upon the Foundation to return the patents. Mr. Garvan, for the Foundation, refused point-blank to comply with the demand, and at the same time issued public statements charging that the action of the Administration was a matter of petty politics, and that it was the result of German intrigue.

The Federal action, Mr. Garvan charged, was taken after conferences between the Department of Justice and local agents of the German dye trust, which, he declared, is determined to regain its former position. The Department of Justice replied, also in a public statement, that Mr. Garvan's

charges were ridiculous; that all it was interested in was the successful defense of the United States Treasury against the Foundation's suits, which involve a sum greater than that paid by the Foundation for the patents; and that the demand for the patents was made, not in behalf of the Germans, but in behalf of the United States Government.

The dyestuffs industry and a large part of the textile trade, which uses dyestuffs, is standing behind Garvan and echoing his charges of petty politics and German intrigue. The opponents of the dye manufacturers in this matter, as in the matter of the embargo, are the importers of German dyes, in addition to members of the press and the general public who suspect that Mr. Garvan and the dye interests are trying to get away with something for their own financial advantage. Outside of industry there seems to be a feeling that it is wrong for a group of business men to take advantage of the position of Germany and to enlist the aid of the Government in building up their industry. The Baltimore *Sun*, for instance, says:

"It has been rather an ill-starred proceeding from the first—this effort of the American dye interests to build themselves up into world power by governmental fiat and under Government tutelage. A group of zealots perceived in the war an opportunity to 'smash' the great German dye business, the product of generations of scientific research. They obtained the seizure of the German patents for their own use; they have been demanding in the face of the strongest kind of public opposition an embargo upon all German dye imports which might interfere with their goal of producing all the dyes necessary for American consumption. They rejected all proposals of a high protective tariff; nothing but an embargo would do. Their tactics in cramming the embargo down the throat of Congress gave rise to a deep-rooted public suspicion that a new American dye trust was in the making and that enormous profits were involved in the campaign."

And the New York *World* says that although the American public has no affection for the German chemical trust, what Americans do care about is that their war records should be squared with the law of nations. In this instance the record has not yet been squared. And Mr. Garvan's apparent desire not to clear his titles in an American court only makes it doubly certain that the Government's proceedings are necessary.

It may be immoral for Americans to benefit by the use of these seized German patents. It may be true, as charged, that Mr. Garvan and his associates are gaining financially by the ownership of the patents. It may be that American dye manufacturers will make money, and American textile manufacturers will pay more for their dyes than they otherwise would pay, if the embargo provision is finally passed.

But when one speaks from the point of view of America's industrial interests as a whole, these are not the real issues. The facts, from that viewpoint, seem to be these: America was enabled by the war to develop an industry which makes an essential product, for which she had previously been dependent upon Germany. If this industry is not temporarily protected by an embargo, it will perish, for it is not yet able to compete with its German rivals. If the German patents are not made available to it, it will have to proceed under a handicap which may prove insuperable. Whether Mr. Garvan's organization or some other owns the patents does not matter, but they must be made available to the industry.

If America wants its synthetic organic chemical industry, the embargo must be continued and the patents retained. If the controversies are decided otherwise, we shall still be able to buy good coal-tar products, but they will be made from the waste of Germany's coke manufacture and our own by-product ovens will have no demand for their output. And if there is another war, we shall have to develop our coal-tar industry all over again.

What Will Coal Cost?

(From page 1405)

demand and the mines commence to compete for orders, these wage reductions will be reflected in the mine selling price. It is too soon to calculate what will be the extent of these wage reductions, when translated from day wage rates and the two hundred items of piece work into tons of coal. For the purpose of this discussion the author will hazard that 50 cents a ton will be a fair estimate."

Having thus disposed of the question of mine prices, Mr. Haring takes up the matter of freight. He points out that the cost of coal to the purchaser varies almost directly with the cost of freight from the mine to the furnace. He says:

"Except for such favored markets as Pittsburgh and Columbus and others situated in the midst of extensive coal territories, the freight rate on coal is ordinarily greater than the price of the coal itself. The secondary cost factor is more important, and heavier, than the primary one. This has been strikingly illustrated this year. For, during the strike, the non-union coal which has tided the market over the shortage of union coal has come chiefly from West Virginia, Kentucky, Tennessee and other Southern States. Coal buyers, under the penalty of suddenly increased freight tolls, have learned that their emergency coal has come from distant fields. The burden of the excess freight has been the great expense of the strike on the public. Markets are so diverse that a specific statement is difficult, because freight rates vary by wide "spreads." It is safe to state, however, that each ton of coal brought from the non-union mines to Northern markets has carried a freight rate of at least $1 to $2, and in many cases far more, in excess of the freight tolls on coal formerly used.

"At once, when the strike ends, coal will become available from more normal sources, that is, the unionized mines. This, in turn, means lower freight rates. The excess freight of our emergency coal, be it $1 or $2 or more, will vanish overnight from the total cost of coal. Instantly fuel costs will be lessened by the amount of this excess freight."

In view of the great importance of the question of coal cost, Mr. Haring's argument is well worth considering. Readers should remember, however, that his statements concerning the present price of coal conflict with those made by authorities in the trade; that he assumes a reduction of mine wages, which is far from certain; and that he assumes lower freight rates, in spite of a predicted car shortage and rail congestion, and in spite of the improbability of further rate-cutting orders from the Interstate Commerce Commission in the immediate future.

Merchandise Fair

(From page 1419)

"So long as the manufacturers' lines are to be seen only in their own scattered salesrooms, and so long as the buyer must undertake the time-consuming task of going from place to place, there will also be a large amount of uncertainty in the mind of the buyer which will operate against the placing of merchandise orders for future needs because the buyer has not really familiarized himself with the entire market.

"On the other hand, so long as the manufacturers meet buyers only as individuals, a few each day, there must always be doubt in the minds of manufacturers concerning the quantity of merchandise that will be required by the retailers and the prices which legitimately may rule. As the fair will call the buying power of the country at the beginning of a season to view the lines of hundreds of manufacturers at one time, thus bringing many thousands of buyers into direct contact with the manufacturers and wholesalers, a balance may be struck which will operate as the working basis both for the retailer and manufacturer, and then with the orders buyers have placed the manufacturer will be in a position definitely to go ahead and plan production. This should operate to bring about a smooth, level flow of goods from producer to consumer which is one of the greatest needs of America today."

If the fair is successful—and its success seems assured—perhaps other trades and industries will find it convenient to adopt the idea.

The INDUSTRIAL CALENDAR

Secretaries of Associations are invited to send us the dates of their conventions as early as possible so that their conventions may be properly listed below. When especially requested by Association Secretaries, we will send dates and other available notices concerning meetings of other associations.

Aug. 22-25. *International Assn. of Municipal Electricians,* New Bedford, Mass.

Aug. 23-25. *American Association of Railroad Superintendents,* Kansas City, Mo. (J. Rothschild, 400 Union Station, St. Louis, Mo.)

Aug. 24-25. *Canadian Gas Association,* Hamilton, Ont. (G. W. Allen, Secretary, 19 Toronto, St., Toronto, Ont.)

Aug. 25-Sept. 1. *National Automobile Show,* Toronto, Ont.

Aug. 28-Sept. 2. *Graphic Arts Exposition,* Mechanics Building, Boston.

Aug. 28-Sept. 2. *National Safety Council,* Detroit, Mich. (S. J. Williams, Sec., 168 N. Michigan Ave., Chicago, Ill.)

Sept. *American Society Agric. Engineers Reclamation,* Second National Convention, Kansas City, Mo.

Sept. *Amalgamated Assn. Street & Railway Employees of America,* National Convention, Oakland, Cal. (R. L. Reeves, Secretary, 260 E. High St., Detroit, Mich.)

Sept. 1-7. *Natural Gas and Petroleum Association of Canada,* Niagara Falls, N. Y. (S. A. Morse, Secretary, 48½ Market Square, Chatham, Ont.)

Sept. 4-9. *American Chemical Society,* Carnegie Music Hall, Pittsburgh, Pa. (Charles L. Parsons, Secretary, Box 1505, Washington, D. C.)

Sept. 4-9. *Gas and Fuel Section of the American Chemical Society,* Pittsburgh, Pa. (Dr. R. S. McBride, Secretary, Colorado Bldg., Washington, D. C.)

Sept. 5-7. *Engineering Institute of Canada,* Winnipeg, Man.

Sept. 5-7. *Rocky Mountain Coal Mining Institute,* Colorado Springs. (F. W. Whiteside, Secretary, Victor American Fuel Company, Denver.)

Sept. 7-9. *New York State Coal Merchants' Association,* Richfield Springs, N. Y. (G. W. F. Woodside, Secretary, Arkay Bldg., Albany, N. Y.)

Sept. 11. *International Union of Steam and Operating Engineers,* Minneapolis. (Dave Evans, Secretary, 6334 Yale Ave., Chicago.)

Sept. 11-15. *Association of Iron and Steel Electrical Engineers,* Cleveland. (J. F. Kelly, Secretary, Empire Bldg., Pittsburgh.)

Sept. 11-16. *Bakery Equipment and Material Exposition,* Municipal Pier, Chicago, Ill. (B. M. Warner, Secretary, Conway Bldg., Chicago, Ill.)

Sept. 11-16. *International Assn. Printing House Craftsmen,* Boston.

Sept. 11-16. *National Association of Stationary Engineers,* Des Moines, Ia. (Fred W. Raven, Secretary, 417 So. Dearborn St., Chicago.)

Sept. 11-16. *National Exposition of Chemical Industries,* Grand Central Palace, New York. (F. W. Payne, Sec., Grand Central Palace.)

Sept. 12-14. *Retail Bakers of America, Chicago.* (J. M. Hartley, Secretary, 10 S. La Salle St., Chicago.)

Sept. 12-15. *American Bakers Assn., Chicago.* (H. E. Barnard, Secretary, 1135 Fullerton Ave., Chicago, Ill.)

Sept. 12-15. *New England Water Works Association,* New Bedford, Mass.

Sept. 12-15. *Atlantic Deeper Waterways Assn.,* Portland, Me.

Sept. 13-15. *Motor and Accessory Manufacturers' Assn.,* Lafayette Hotel, Buffalo, N. Y.

Sept. 14-16. *American Assn. of Port Authorities,* Toronto, Ont.

Sept. 19-22. *Pacific Coast Gas Assn.,* Santa Barbara, Cal. (W. M. Henderson, Secretary, 445 Sutter St., San Francisco, Cal.)

Sept. 21-23. *American Electrochemists Society,* Hotel Windsor, Montreal, Canada.

Sept. 23-27. *National Assn. of Cost Accountants,* Atlantic City, N. J.

Sept. 23-30. *New York Closed Car Show,* Grand Central Palace, New York.

Sept. 25. *American Institute of Mining and Metallurgical Engineers,* San Francisco, Cal.

Sept. 25-28. *Illuminating Engineering Society,* Boston, Mass. (Clarence Law, Seccretary, Irving Pl. and 15th St., New York City.)

Sept. 25-28. *Southwest Water Works Association,* Arlington Hotel, Hot Springs, Ark.

Sept. 25-29. *National Association Retail Druggists,* Detroit, Mich. (S. C. Henry, Secretary, 168 N. Michigan Blvd., Chicago, Ill.)

Sept. 25-29. *National Drainage Congress,* Kansas City, Mo.

Sept. 25-30. *American Society for Steel Treating,* Detroit. Tentative.

Sept. 25-30. *National Association Advertising Specialty Mfrs.,* Chicago, Ill. (B. Blackwood, Secretary, 208 S. LaSalle St., Chicago, Ill.)

Sept. 26-30. *National Assn. Ry. & Utilities Commissioners,* National Convention, Detroit, Mich. (James B. Walker, Secretary, Pelham Manor, N. Y.

Foreign Events

September. *Sociedad Rural Argentina,* Buenos Aires, Argentina.

Sept.-Nov. *Engineers Congress,* Rio de Janeiro, Brazil.

Sept. 5-15. *Second Eastern Fair,* Lemberg, Poland.

Sept. 7-Nov. 12. *International Exposition (centennial),* Rio de Janeiro, Brazil.

Sept. 15. *International Fair,* Bandoeng (Java).

Sept. 15-20. *Automobile Show,* The Hague, Holland.

Sept. 18-23. *Second Annual Meeting of the International Chamber of Commerce,* Rome, Italy.

Sept. 21. *Textile Fair,* Hamburg, Germany.

Sept. 22-25. *Fifth International Fur Fair,* Lucerne, Switzerland.

Sept. 25-Oct. 3. *Automobile Show* at the Kaiserdamm Hall, Berlin, Germany.

Oct. 1-15. *General International,* Lyons.

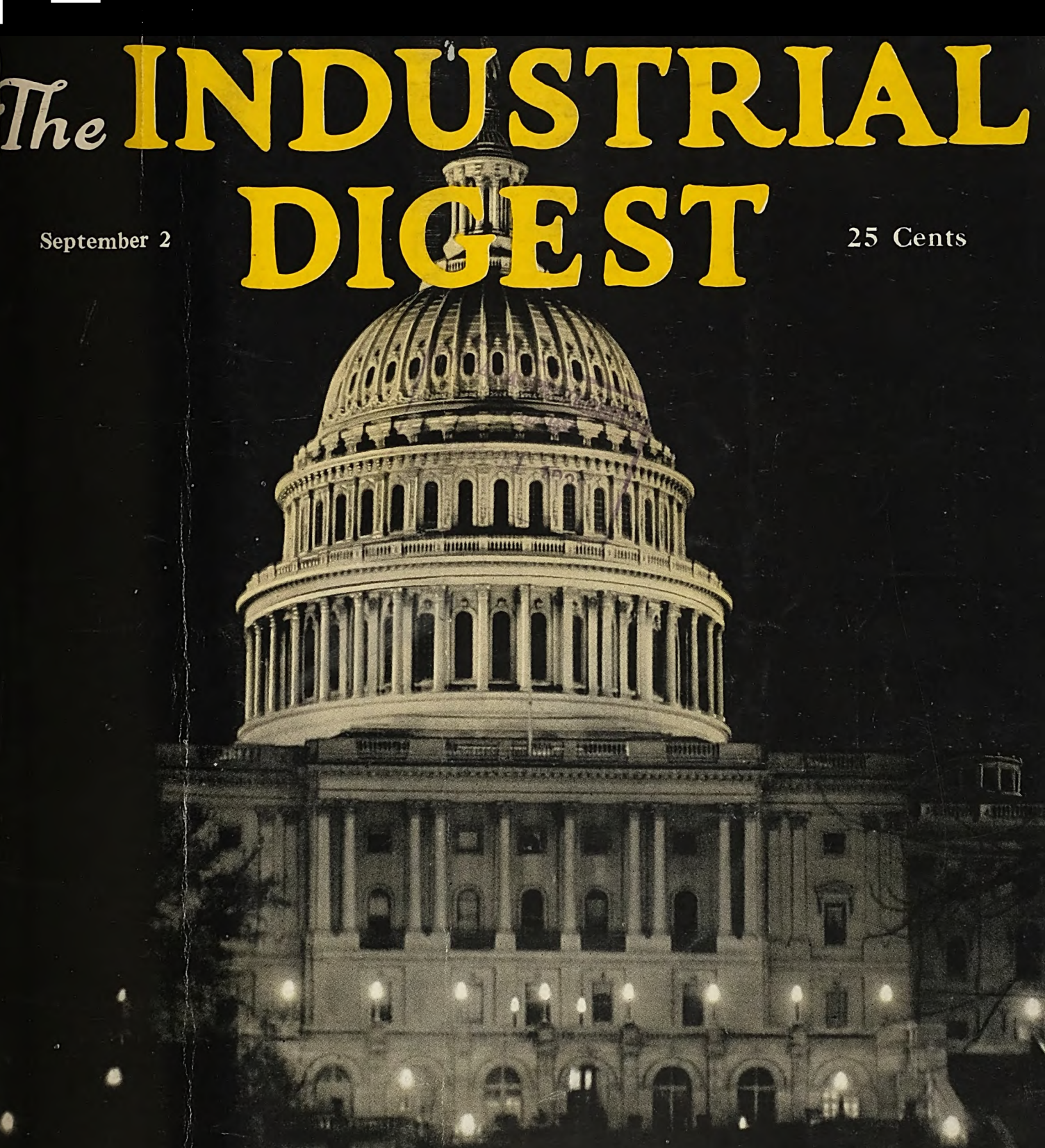
Oct. 4-15. *Automobile Show,* Grand Palais, Paris, France.

Oct. 12-23. *International Commercial Vehicle Exhibition* at Olympia, London, England.

The INDUSTRIAL DIGEST

September 2

25 Cents



What the Government Is Doing for Industry:

Talk, Talk, Talk

See page 1466



The Davis Regulator
—a safe investment

THE Davis Regulator will reduce any initial pressure to any desired delivery pressure and maintain the lower pressure constant. The following prices are net F. O. B. Chicago and apply to both the diaphragm and the piston types.

Size, in.	Price	Size, in.	Price
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THE INDUSTRIAL DIGEST

A fortnightly digest of the informative articles in one thousand leading industrial magazines covering thirty industries

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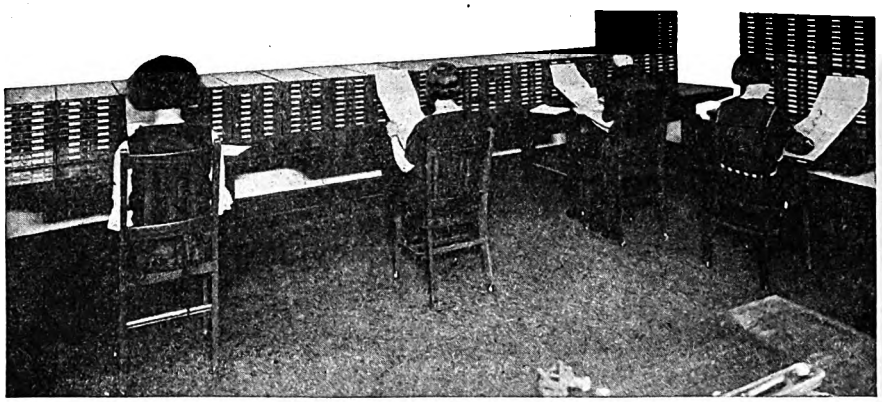
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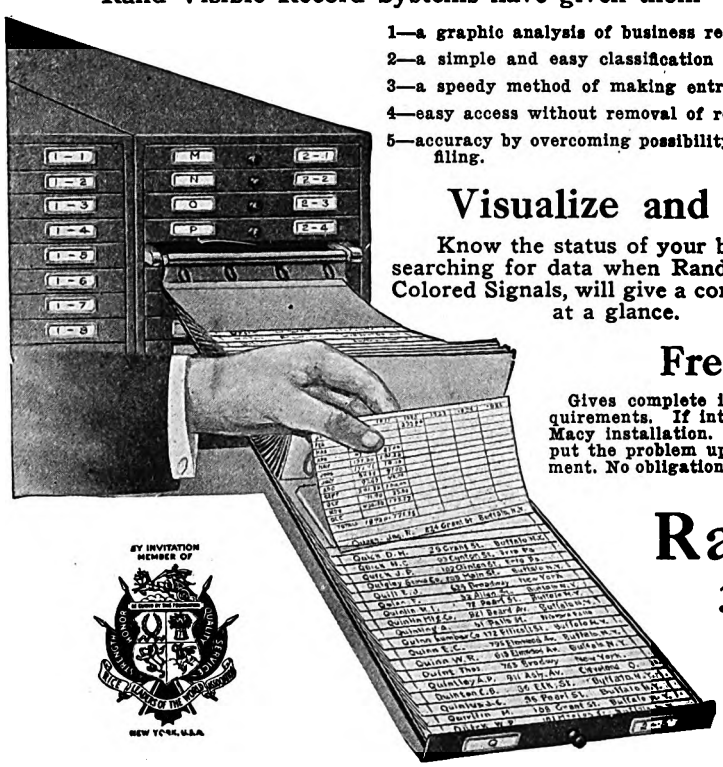
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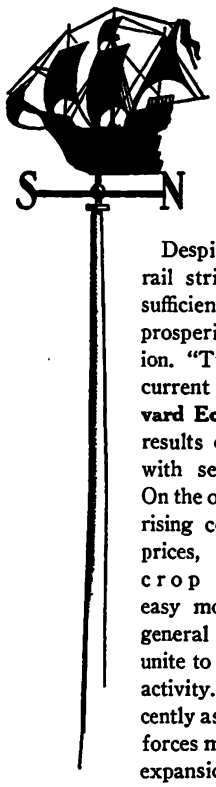
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Vol. 1
No. 22

THE INDVSTRIAL DIGEST

Sept. 2
1922



The Business Weathervane

A Summary of Expert Opinion

Despite the unfavorable effect of the coal and rail strikes, the impetus of fall orders will be sufficient to carry business over into decided prosperity, according to the consensus of opinion. "Two sets of opposing forces impinge upon current manufacturing activity," says the **Harvard Economic Service.** "On the one hand the results of the coal and railroad strikes combine with seasonal influences to reduce operations. On the other hand rising commodity prices, favorable crop estimates, easy money, and general optimism unite to accelerate activity. As recently as June, the forces making for expansion seem to have exerted the greater influence. . . . In July, upon the other hand, shortage of fuel became much more serious, and the volume of manufacture made no further substantial advance; in fact, may have receded somewhat during the past month. With the serious labor disputes of recent months brought to an end, a further expansion of industrial output in the fall is to be expected. Certainly underlying conditions are essentially favorable."



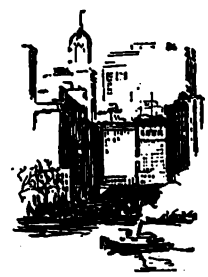
(Chicago Tribune)

Next on the program will be a sprightly juggling act.

The Annalist (New York) points out that "Business, as a whole, is extremely spotty, due in large measure to the labor difficulties, and to the ramifications of these difficulties, which include dislocation of prices and a feeling of hesitancy among buyers. It may be said that the steel, copper, textile, oil, leather, farm machinery and similar industries are procceding along fairly normal lines. Their business, according to corporate reports, is not so large as in the first half of 1922, but is in sufficient volume to assure moderate production figures for the balance of the year, and the continuation of such dividends as were paid in the first part of the year. On the other hand, such industries as the automobile, rubber, shipping and similar lines have probably reached the peak of activity for 1922, and earnings in these lines are uniformly lower."

Dun's Review believes that "Stimulus to trade activities is to be expected as the end of the summer approaches, yet various uncertainties exert a restraining influence, and a full measure of business development is lacking. Hesitation in entering upon important new commitments not unnaturally results from the doubts about future supplies and prices of commodities, and not a few transactions, as in steel and iron, are prevented by the inability of sellers to make early deliveries. With costs of production further enhanced in some industries by upward wage revisions, price increases are still being established, *Dun's* list of wholesale quotations disclosing an excess of advances, and premiums over the regular market are readily obtainable where there is any advantage on shipments. Notwithstanding higher prices, however, profit margins have been appreciably reduced in many instances, and more is heard in textile lines and some other channels of sharp competition for orders. Resistance to rising prices is apparently undiminished and the condition no longer prevails where the buyer is compelled to take the initiative in most dealings, although this remains the case where there is an actual scarcity of merchandise. The general situation continues to present many contrasts and irregularities, but the status of business, in spite of the protracted labor troubles, is more favorable than had been commonly anticipated when the year opened. With large crops foreshadowed, with improved financial and credit phases, and with many of the former weak spots eliminated, progress should gain momentum when the strikes are definitely settled."

Bradstreet's points out that "Optimistic expressions as to the future stress the expected or predicted higher prices as in themselves offering a basis for more activity in trade and industry, and this only two years after the collapse of values at that time attributed to costs having reached unbearable heights. The stock market has continued to register confidence in present or higher prices for securities."



The Fortnight

The Coal and Rail Strikes

CONGRESS is about to do something. The rail strike, with its attendant dangers to industrial prosperity, has not stirred our elected representatives to any action. The Administration has (wisely, according to most opinions) decided to let the railroads work out their own salvation. Thus far, no serious harm has resulted.

The bituminous coal situation, which dragged along for 18 weeks before any sign of settlement was in evidence, and is still far from being removed from our path of prosperity, did not electrify the Government at Washington into action.

But now a situation has arisen—and Congress expects to do something. The dear Peepul are faced with a fuel shortage this winter. The anthracite coal miners have endangered the comfort of our voters, and there you have the solution. November elections plus a November hard coal famine spell disaster to politicians, and so they are preparing to take over the mines. Of course the bituminous situation was much more serious than the anthracite problem, but it did not interest so many voters.

Editorial opinion seems to be about equally divided between support for Government operation of coal mines and warnings against a repetition of the railroad operation fiasco.

Very likely the anthracite operators and miners, having enjoyed their vacation, will shortly shake hands and once more attempt to collect the bill (estimated at approximately $300,000,000 more than the 1921 fuel bill) from the public.

The rail situation would not be serious but for the fact that the men on strike have chosen a remarkably appropriate time to insist on their demands. Although fundamental business conditions point to a decided improvement this fall there is one factor which may easily block the entire program. That factor is a freight tie-up. The facts are these: On August 1, 1921, the United States and Canada had a net surplus of 125,000 box cars. On August 1 this year the net surplus was less than 30,000. Rolling stock all over the country is in poor condition despite energetic efforts of railroad executives to keep it in good order. As long as the strikers stay out this rolling stock is certain to deteriorate and will probably result in reducing the number of available freight cars very materially. The crops this fall will require a great many more cars than last year's crop. Coal shipments which have been held up for months will be thrown on the roads just at the time when fall business should be picking up. From all reports, a very serious congestion of transportation facilities must be expected, not later than October 1.



(Newark Evening News)

The doormat may get a respite.

Effects of the Steel Wage Increase

THE most important industrial event in the last fortnight was the announcement of many companies in the steel industries of a 20% wage advance. This is a development of prime importance and presages, in most opinions, an end to wage deflation. President Gompers of the American Federation of Labor has estimated that wage deflation has been completed, with labor accepting an average decline the country over of not more than 5% from wartime levels. Certain authorities believe that there has been a temporary cessation in wage declines, but that the movement will start downward again next spring.

This decision of the important steel mills to advance wages was no doubt largely influenced by the cost of living, which has recently shown an upward trend. Commodity prices have been recovering all along the line and are likely to go higher during the next few months. This applies particularly to the basic raw materials which have been thoroughly liquidated; it will also apply to the prices of finished goods as the cost of raw material advances. In all probability this tendency to increase commodity prices will be strengthened by the car shortage. The shortage of manufactured products in most manufacturing centers will surely be reflected in advanced prices to the consumer.

Tariff Bill Certain to Increase Prices

ANOTHER element which is certain to play a prominent part in increasing prices to the consumer is the tariff. This will be the case whether the tariff bill in its present form is passed or not. The bill now in conference is so strictly protectionist that it will force prices up, thereby advancing the business cycle near to the point of inflation.

The passage of such a tariff bill at a time when Europe owes us billions of dollars is certain practically to destroy our export market. Europe must pay us eventually in goods or in gold, and if she cannot export to us then she cannot buy our exports. Conditions in Europe continue highly unfavorable. The war debts of practically every one of the European countries are

in Perspective

unbearably heavy. Paper money is being steadily discredited. Producing wealth by the printing press may give temporary relief, but in the long run it is suicidal. Where it does not lead to depreciation, it increases the taxes that will sometime be levied to pay the debts. The paper mark in Germany is practically worthless today. Then, too, Europe is suffering from the same malady that this country will suffer from if the tariff bill is passed—impassable walls of what Ex-Secretary of the Treasury, David F. Houston, calls "hostile states of mind, by trade and transportation restrictions, burdened with enormous expenses for defense against one another." Could the United States prosper if each of our States were surrounded by tariff walls, and if every State maintained a standing army for defense against its neighbors? To pass a tariff bill that makes international trade relations more difficult at a time like this simply serves to emphasize the almost incredible stupidity of our Government bodies.

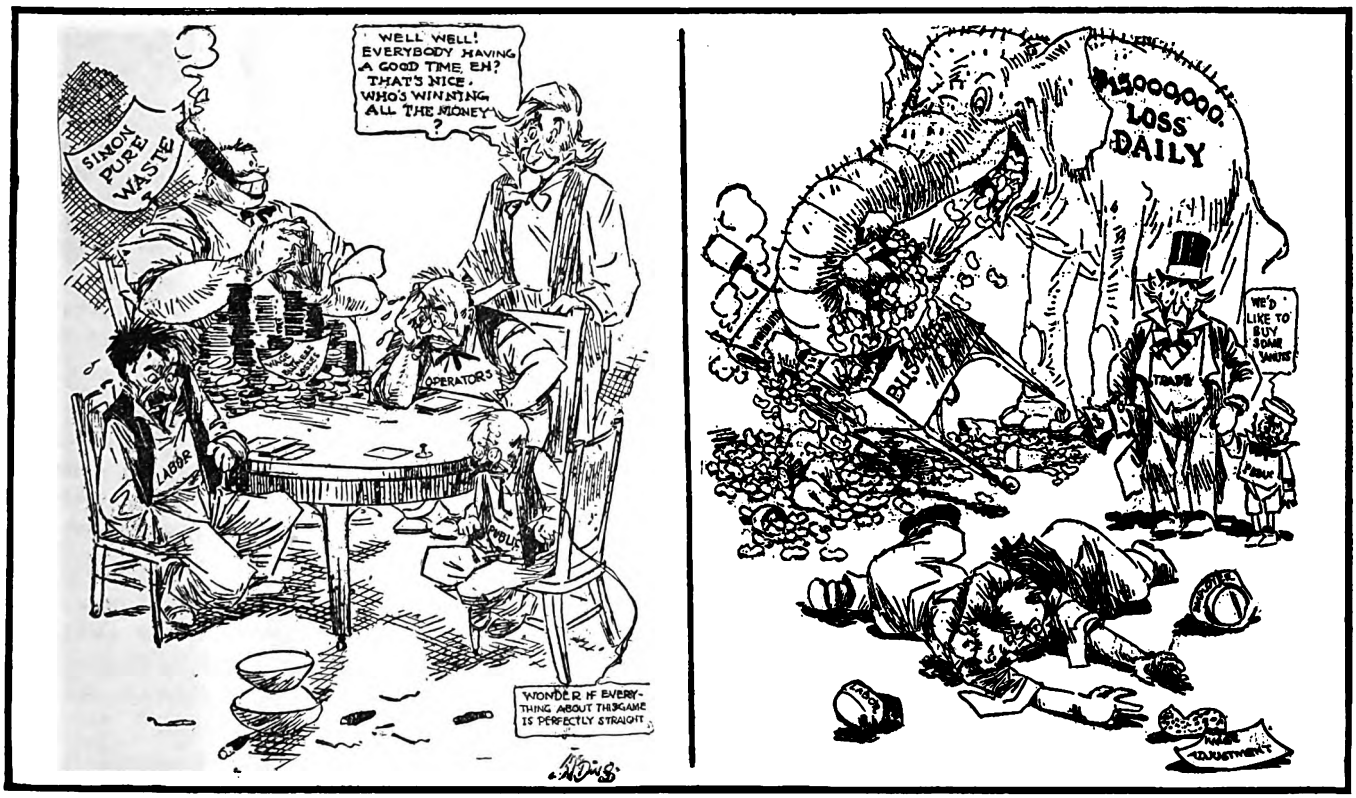
Is This Inflation?

SOME authorities think that the present price increases mean that we are entering another period of inflation. The index of the Bureau of Labor Statistics shows that at the end of July wholesale prices were 12% higher than they were last January, when the low point of the present movement was reached. That looks like a big increase, taking place in only seven months. It is not to be wondered that talk of inflation has appeared.

But when one looks at things in the light of price movements over a slightly longer period, it becomes apparent that a 12% increase in seven months is not, in this case, to be considered inflation. The July price level is about the same as that which prevailed in March, 1921. It is 37% below the level of May, 1920, when the peak of the boom was reached. Prices would have to advance for three years at the present rate before they would regain the 1920 heights.

Further, it should be remembered that a large element in the present price increase is due to rises in the cost of steel and coal. These rises have been due to a scarcity which, however severe it may be at the moment, is after all merely temporary. The scarcity surely will disappear, even if the price increase does not.

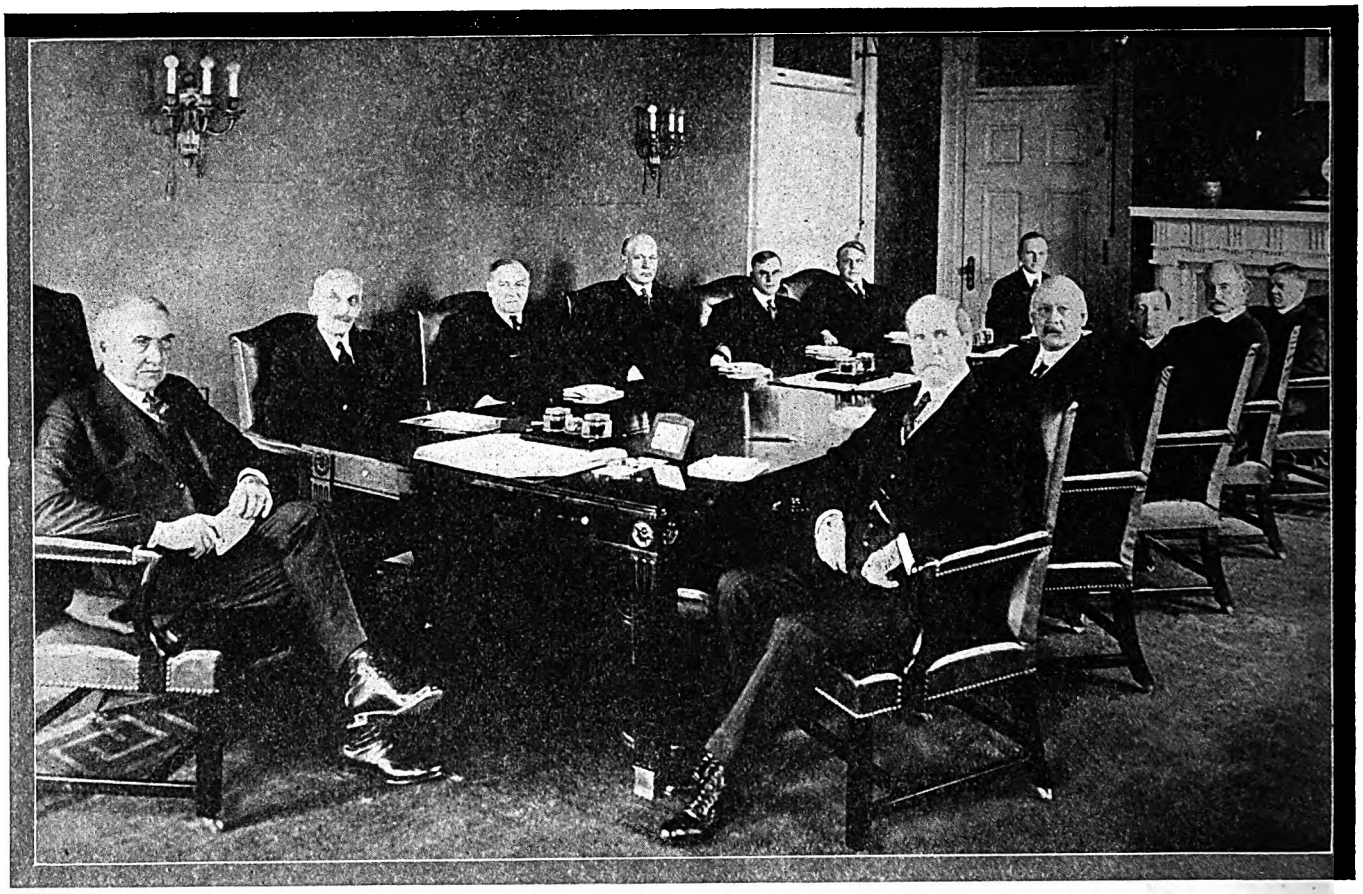
Therefore, some observers question the soundness of statements that we are entering another period of real inflation. It has also been pointed out that such talk is not conducive to content among wage earners. This appears to be a period of labor unrest. Unemployment is no longer as widespread as it was a few months ago and strikes are growing more frequent than they were when jobs were scarce. A condition such as that which now prevails is conducive to strikes. Remarks that prices are becoming inflated and attempts at actual inflation will hardly improve this state of affairs.



(New York Tribune Syndicate)

A great game—who's ahead now?

No wonder some folks have to charge high for their peanuts!



A recent picture of the Cabinet in session with President Harding to consider the threatening industrial crises.

What the Government Is Doing for Industry: *Talk, Talk, Talk*

THE slogan by which the present Administration won its way into public favor was "Less Government in business, more business in Government." This worked very well in 1920, when business needed a period of rest from priority orders, restrictions against financing Government operations, and all the ills of the present war period.

But the "old suits of clothes full of wind," as one contemporary calls our representatives at Washington, seem to have interpreted this slogan in a most amazing manner. Faced by the coal and rail strikes, and with the problem of working out the tariff bill, they have apparently interpreted the slogan to mean that no matter how serious a problem may confront business, Congress should play safe and keep hands off. There have been endless conferences at Washington about the strike situation. The press has been filled with threats and rumors of action. The President is continually on the verge of "doing something"—but nothing has been done. The partial settlement of the soft coal strike came without any help from the Government, and the railway executives are vigorously working out their own salvation. As for the tariff bill, nearly everyone who appreciates its significance awaits its passage with the expectation of one who has been handed a bombshell with a lighted fuse.

There have been nothing but words at Washington. The amount of "hot air" expended on the coal strike would doubtless heat the country's homes if properly applied. The amount of commotion in our newspaper headlines caused by announcements from "high officials" would relieve the freight congestion if turned into the proper channels. As for the tariff bill, it is "protection gone mad." And those Congressmen who are re-elected in spite of their favorable votes for the measure may say with satisfaction, "Well, now that we got away with that, what more can you ask?"

What the country needs is not less Government in business, nor even more business in Government, but more business men and fewer politicians.

And since we cannot have this immediately we would be willing to accept from our present Congressmen an ounce of action in exchange for a ton of talk.

A Politician's Tariff

Proving that the attempt to please everybody results in pleasing nobody except Congressmen

IN a conference room in Washington ten Congressmen are now preparing the tariff bill which, it is expected, will become law in October. They have before them the Fordney bill, the fruit of months of labor by the House of Representatives, and the 2436 amendments, which the Senate painfully prepared under Mr. McCumber's leadership. They must reconcile these two, and the product which they compound will be the tariff under which American industry will work for the next few years at least.

Will good or evil come from that conference room? Will the tariff that the conferees write help American business to regain prosperity, or will it make things worse than they are now?

If one is to judge by what has been written in the press about the Fordney-McCumber tariff, the product of the conference room is pretty certain to contain more evil than good. Bankers, economists, business men and editors have said that the new tariff, as passed by the Senate and the House, is protectionism gone mad. Even Republican newspapers of long standing, which have always favored high protection, think that Congress is going a little too far. This tariff, they say, will stifle our import trade completely, especially if the conferees adopt the American valuation plan, which Mr. Fordney says he will insist upon. Unless we carry on a heavy import trade, say the critics of the tariff, we cannot collect what Europe owes us, and we cannot do much of an export trade, because the rest of the world must, in the long run, pay us for our goods, our services and our loans by shipping commodities to us. This argument, and the statement that the tariff will send prices sky-rocketing and increase the cost of living, has been sounded and resounded all over the country throughout the stormy days during which the tariff has been under consideration.

An effort to find newspaper comment favorable to the Fordney-McCumber tariff is almost entirely fruitless. About the most enthusiastic statement to be found is that of the Omaha *Bee,* which says rather tamely:

"The tariff has a twofold purpose—to raise revenue and to give protection to American producers. The Fordney-McCumber bill will fulfill this purpose."

Most comment on the passage of the McCumber bill by the Senate is derisive. *The New York Evening Post,* a paper whose appeal is largely to business men, says:

"To the very end the Fordney-McCumber tariff bill runs true to form. Lest by some neglect it might not be so bad as the country fears, the resourceful Finance Committee of the Senate throws a hundred amendments into the hopper at the last minute when it is too late under the rules to have much debate upon them. One set of rates, that upon household utensils, which had been passed over at the request of the committee, triples the duties laid by the bill as it came from the House. This is too much for some Senators on the majority side, and the higher rates are defeated. So is a proposed duty upon oil. Senator Kellogg manages to get logs and poles on the free list, and raw tomatoes are to be admitted free from December to April, inclusive. With good spots like these in the bill it is plainly impossible to characterize this measure as the worst possible tariff bill. It is merely the worst tariff bill since the famous "tariff of abominations" of 1828.

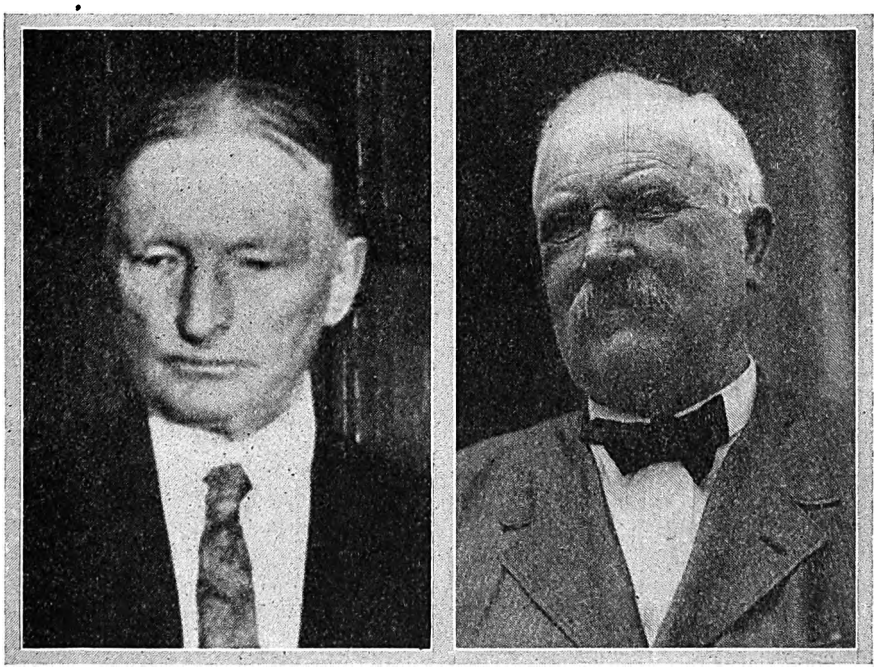
"These last-minute changes confirm the character of the pending tariff bill as utterly at variance with the demands of the economic situation. At a moment when we are emphatically a creditor nation, when we are seeking to sell abroad, when domestic prices are still trying to find their proper level—at such a moment we raise the highest barrier we have ever raised against those who would sell to us in return for what they have bought and desire to buy, and we give our manufacturers so great an opportunity for profiteering that Senator McCumber himself has been moved to beg them in advance to be reasonable. Fortunately, this exhibition of combined ineptness and favoritism has been so glaring that the voters who are to go to the polls in November will labor under no illusions regarding the actual nature of the first 'all-American' tariff."

Little improvement in the tariff is to be expected to come as a result of the work of the Congressional conference committee, the *Post* thinks.

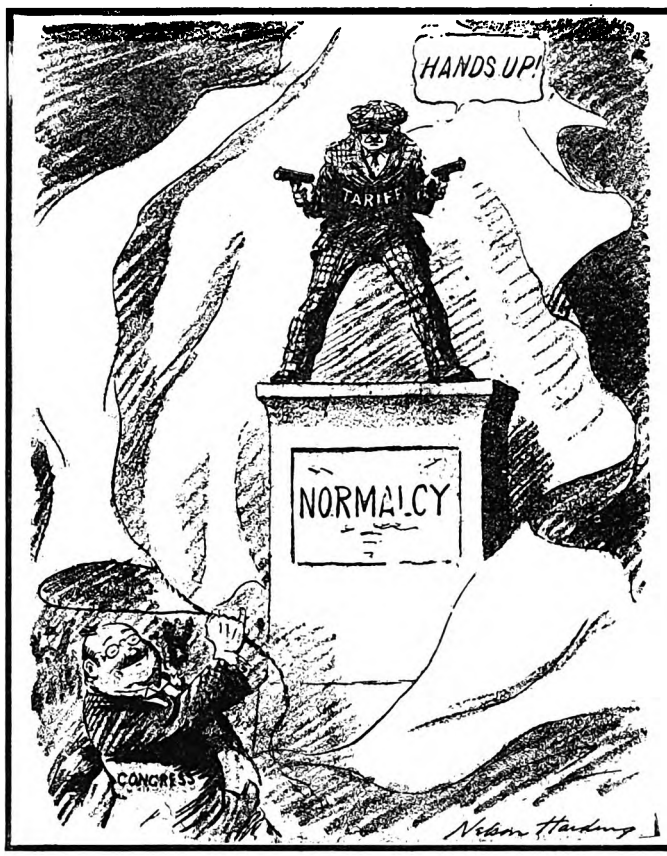
"The most flagrant optimism that the country has seen in many a day is to be found in reports from Washington correspondents that 'some of the rates in the tariff bill may be scaled down in conference,'" the newspaper adds.

"A glance at the personnel of the conference committee shows that this is a forlorn hope. The committee will be dominated by four men—Messrs. Fordney and Longworth from the House, and McCumber and Smoot from the Senate. The Democratic conferees, as is always the case in minority representation on conference committees, are there by courtesy. The two other Republican members, Representative Green of Iowa and Senator McLean of Connecticut, are not regarded as such extremists as their party colleagues, but as they will be outnumbered two to one, it is readily seen that the outcome of the conferees' deliberations will be entirely in the hands of the aforementioned quartet.

"With Fordney ready to 'fight till the snow flies' for American valuation, with Longworth wholly committed to the dye embargo, with Smoot looking after the interests of the beet sugar producers of the West and of the textile industry everywhere, and with McCumber serving as the watchdog of the farm bloc, there



Senator McCumber, N. D., and Congressman J. W. Fordney, Mich., sponsors for the new tariff bill.



The masterpiece unveiled.



(Brooklyn Daily Eagle)

Take it away.

is little prospect for any of the abominations of the tariff bill being eliminated in conference. Men do not gather figs of thistles."

Why the Tariff Bill Is Attacked

THE tariff is not attacked because it is protective, but because its rates are injudicious even from the protectionist point of view. "With the theory of protection there may or may not be ground to quarrel," says the *Journal of Commerce*, New York, "but no such academic issue has been raised."

"What has been under debate has not been protective theory, but practical adjustment of duties. If Democrats ever in their political utterances sought to attack the doctrine of protection they have not done so at this session. On the contrary, they have voted steadily for high duties—the higher the better for their own local products," continues the *Journal*.

"What has been under real discussion is the question just how much the public at large will endure. It has been frankly conceded, sometimes in so many words, that what was wanted was to shut out all importation, so far as practicable. No duty has been too high for some Senators; this they have admitted in so many words. No concession to others was too severe if they could have what they wanted for their own districts—this they have frankly stated, according to authentic report, in conversations behind the scenes. The 'debate' has been a discussion as to how far they could go, what the public would stand and how the spoils were to be divided. This has appeared more clearly than perhaps in any preceding debate. The usual evasions and misstatements about 'foreign invasion' of our market have been proven false or without foundation, for there has been nothing in our languishing trade to warrant fear of general competition from abroad.

"As for the mask of 'scientific' tariff-making; that has been boldly flung aside and trampled under foot. No one has been so poor as to do any reverence to the tariff commission, and though there has been a faint revival of the 'businessman's' cry of taking the tariff out of politics, it has been so manifestly lacking in any regard or support in Congress as to receive hardly more than mere notice. This, in a sense, is a real advance, because the tariff commission demand was never a practical plan at best, and it is well in future debate to jettison the whole thing as excess baggage. Its absence, however, has left some features of tariff bargaining sticking out in a rather raw and undecorative way."

The chief difficulty before the conferees is the American valuation plan. Mr. Fordney says that he and the other conferees representing the House will fight desperately for the inclusion of this provision in the final bill. Senator McCumber and his colleagues are determined to cling to the foreign valuations.

Another stumbling block will be the provision inserted by the Senate permitting the President to change rates. Sentiment in the House of Representatives is that this smacks of autocracy. Moreover, in Mr. Fordney's opinion, flexible rates can be more safely assured by basing the schedule on the American valuation of goods, which will fluctuate with changing economic conditions, than by permitting the President to make changes at will.

Thus the two bills before the conference differ in principle. The adjustment of the differences in individual rates cannot be settled until these matters of principle are determined. The rates, to some extent, depend upon the principle. For instance; if American valuation is adopted, the Senate conferees will doubtless be willing to accept many of the lower rates of the House bill.

* * *

The harassed conferees must solve these problems, if they can, in such a way as to save the Republican party from embarrassment. No one will envy them their task.

However they perform the job, they will have a hard time reflecting any glory upon Congress. Congress has been fussing around with the tariff ever since May 27, 1919, when the House Ways and Means Committee started to gather information on which to base the new schedules. Since then it has inquired, investigated, talked, debated, voted, amended,

reconsidered and then inquired, investigated and talked some more. All this, supposedly, was done for the benefit of American industry. The net result is the Fordney-McCumber tariff, which, to be sure, will give needed protection to certain individual industries, but which, most persons agree, will do industry as a whole far more damage than good.

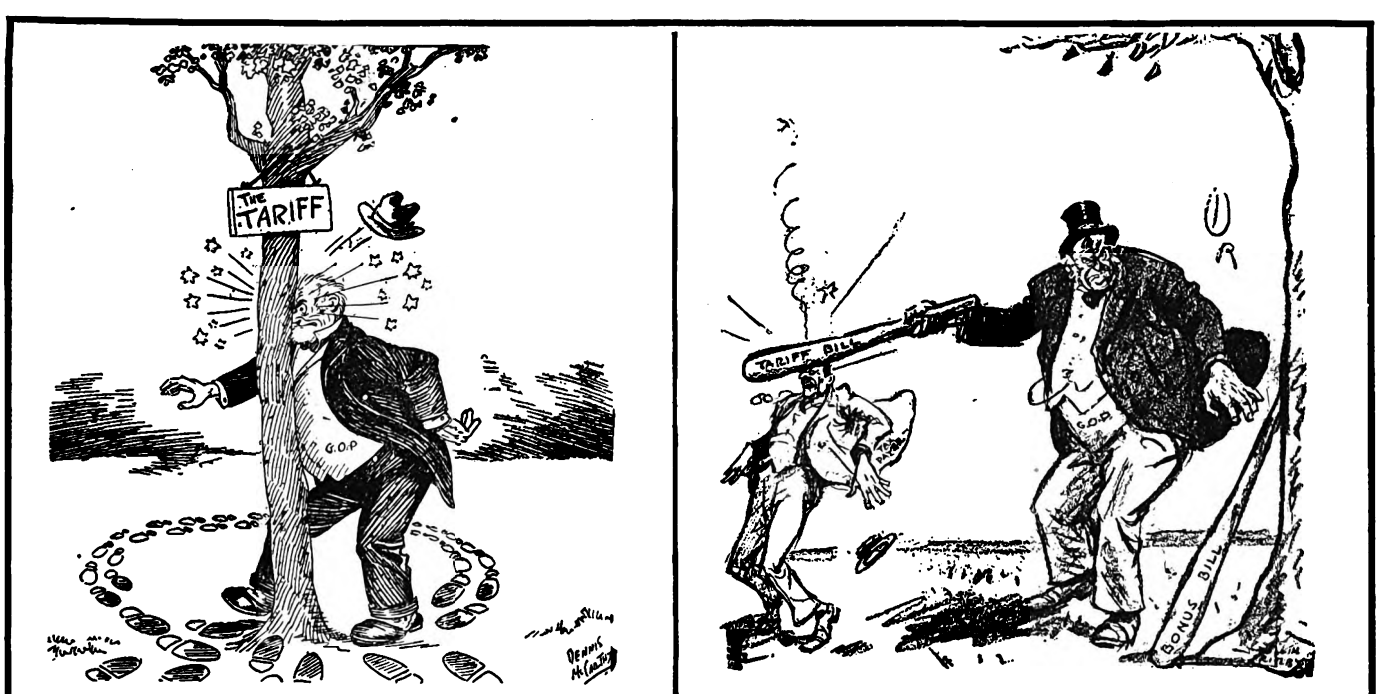
The Tariff Bills Compared

HOW do the rates in the Senate tariff bill compare with those of the House bill? How does the new Republican tariff compare with the old Democratic Underwood bill? These questions are answered in detail in the following tables.

The tables are based on summaries printed in the *Journal of Commerce*, New York. A few items have been omitted because the tariff provisions are too complicated to be expressed in concise tabular form, or because the scheme of the schedules had been so changed in the Senate bill that no comparison with the House and Underwood bills is possible.

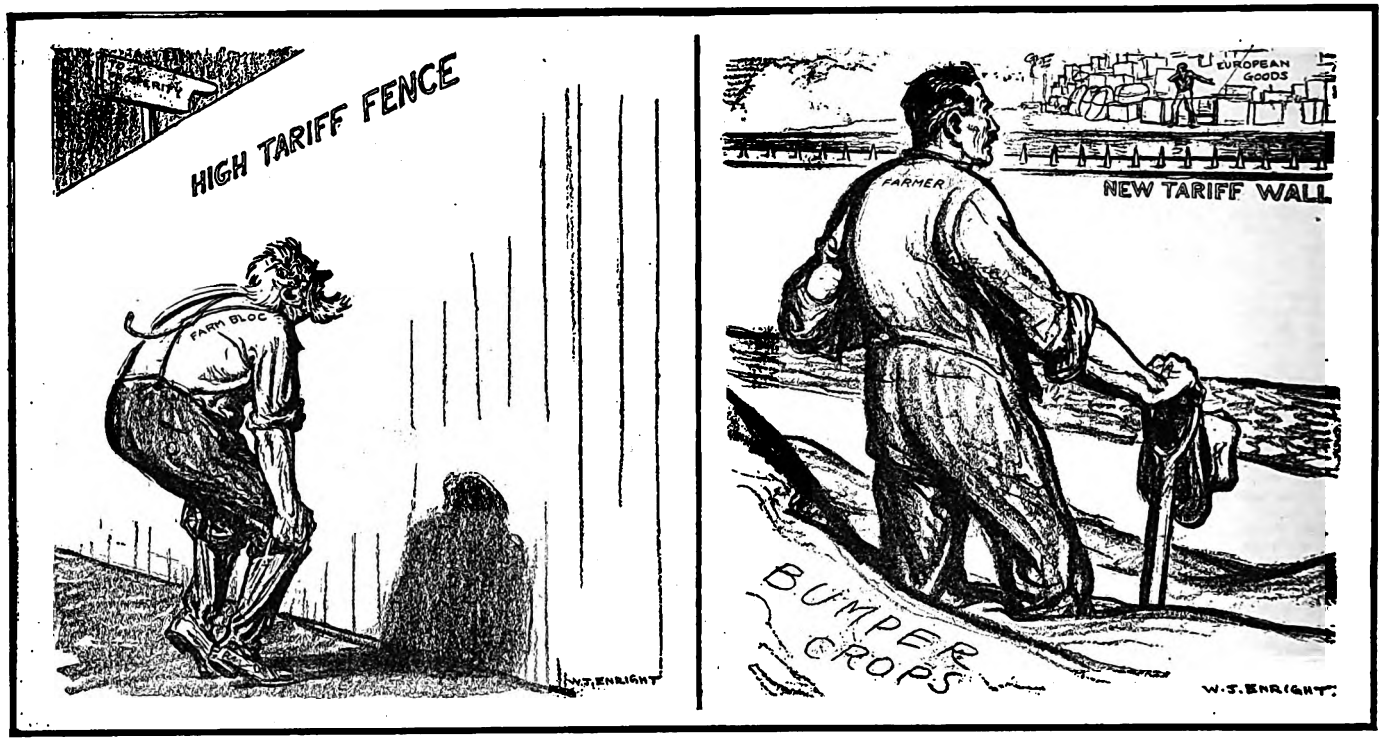
SCHEDULE I
CHEMICALS, OILS AND PAINTS

Article	Senate Bill	House Bill	Underwood Law
Acetic acid, under 65%, lb.	¾c	¾c	Free
Acetic anhydride, lb.	5c	5c	2½c
Boric acid, lb.	1½c	2c	¾c
Choloreacetic acid, lb.	5c	5c	15%
Citric acid, lb.	18c	12c	5c
Lactic acid—			
Under 30%, lb.	2c	1½c	1½c
30-55%, lb.	4c	3c	1½c
Over 55%, lb.	9c	5c	1½c
Tannic acid—			
Under 50%, lb.	4c	4c	5c
Over 50%, lbs.:			
Non-medicinal	10c	10c	5c
Medicinal	20c	20c	5c
Tartaric acid, lb.	6c	6c	3½c
Arsenic acid, lb.	3c	25%	Free
Arsenious acid, lb.	2c	25%	Free
Formic acid, lb.	4c	25%	1½c
Gallic acid, lb.	8c	25%	6c
Oleic acid, lb.	1½c	25%	15%
Oxallic acid, lb.	4c	25%	1½c
Phosphoric acid, lb.	2c	25%	Free
Pyrogallic acid, lb.	12c	25%	12c
Prussic acid	25%	25%	Free
Stearic acid, lb.	1½c	25%	15%
Silicic acid	25%	25%	Free
Other acids	25%	25%	15%
Acetaldahyde, etc., lb.	6c & 30%	6c & 30%	15%
Acetone, lb.	25%	25%	1c
Alcohols—			
Amyl, butyl, propyl, lb.	3c	6c	¼c
Fusel oil, lb.	2c	6c	¼c
Methyl (wood), gal.	10c	15c	Free
Ethyl non-bev., gal.	10c	15c	$2.60
Alkalies, Alkaloids	25%	25%	15%
Iodoform, lb.	25%	25%	15c
Chromium hydroxide, crude	25%	25%	Free
Sugar of milk	25%	25%	Free
Ichthyol oils	25%	25%	Free
Alkalies with 50% of bicarbonate soda, lb.	25%	25%	¼c
Aluminum hydroxide, lb.	1c	1c	15%
Potash alum, lb.	¾c	1c	15%
Alum cake, lb.	3-10a¾c	3-10a¾c	15%
Other aluminum compounds	35%	25%	15%
Ammonium—			
Carbonate, lb.	1½c	1½c	¾c
Chloride, lb.	1¼c	1¼c	¾c
Nitrate	1c	25%	Free
Perchlorate, lb.	1½c	25%	Free
Phosphate, lb.	1½c	25%	1c
Sulphate, lb.	¼c	3-5c	Free
Ammonia, anhydrous, lb.	2½c	2½c	2½c
Antimony oxide, lb.	1½c & 25%	2c	15%
Tartar emetic, lb.	6c	5c	15%
Other antimony compounds, lb.	1c & 25%	25%	25%
Argols under 90%	5%	5%	5%
Argols over 90%, lb.	5c	5c	2½c
Rochelle salts, lb.	5c	5c	2½c
Calcium tartrate	5%	5%	5%
Balsam crude	10%	10%	10%
Gum amber, lb.	$1	Free	$1
Amberoid, unmfd. lb.	$1	Free	$1
Gum arabic, lb.	½c	Free	½c
Barium, lb.—			
Carbonate	1¼c	1c	15%
Chloride	1¾c	1½c	¼c
Dioxide	4c	4c	1½c
Nitrate	2½c	2c	15%
Blackings	25%	25%	15%
Polishing powders	25%	25%	15%
Bleaching powder, lb.	1-5c	3-5c	1-10c
Caffeine, lb.	$1.50	$1.50	$1.00
Caffeine compounds	25%	25%	25%
Impure tea, lb.	1c	1c	1c
Calcium carbide, lb.	1c	1c	Free
Calomel	45%	30%	15%
Carbon tetachloride, lb.	2½c	2½c	1c
Casein or lactarene, lb.	4c		
Chloroform, lb.	6c	8c	2c
Tetrachloroethane	50%	25%	15%
Chalk, ground, dry, lb.	35%	15%	1-10c
Chalk, ground in oil, lb.	¾c	25%	15%
Chalk, manfrd.	35%	25%	25%
Chemical compounds—			
Gold salts, etc.	25%	15%	10%
Bismuth salts, etc.	35%	25%	10%
Medicinal	25%	25%	25%
Alcoholic—			
Under 20%, lb.	20c & 25%	20c & 25%	10c & 20%
20-50%, lb.	40c & 25%	40c & 25%	20c & 20%
Over 50%, lb.	80c & 25%	80c & 25%	40c & 20%
Chicle, crude, lb.	15c	15c	15c
Chicle, refined, lb.	20c	20c	20c
Chloral hydrate, etc.	35%	25%	25%
Texpine hydrate	35%	25%	25%
Coal tar products (not dyes), lb.	7c & 75%	7c & 30%	2½c & 15%
Coal tar dyes, lb.	10½c & 90%	7c & 35%	2½c & 15%
Cobalt, oxide, lb.	20c	20c	10c
Cobalt sulphate, lb.	10c	25%	15%
Cobalt salts & comp'ds.	30%	25%	15%
Collodion, lb.	35c	35c	15%
Block collodion, lb.	40c	40c	25%
Polish collodion, lb.	60% & 25%	65c	40%
Vulcanized fibre, lb.	35%	40c	25%
Casein compounds—			
Unmanufactured, lb.	25c	25c	Free
Manufactured, lb.	40c & 25%	40c & 25%	Free
Salop	10%	10%	Free
Balm of Gilead	10%	10%	Free
Drugs, barks, etc.	10%	10%	10%
Aconite	10%	10%	Free
Aloes	10%	10%	10%
Asafetida, ipecac	10%	10%	Free
Mate	10%	10%	15%
Insect flowers	10%	10%	10%
Buchu and coca leaves, lb.	10c	10c	10c
Gentian, lb.	¼c	¼c	¼c
Licorice root, lb.	½c	½c	¼c
Sarsaparilla root, lb.	1c	1c	1c



(New Orleans Times-Picayune)
Lost—lost in an impenetrable forest.

(New York World)
Soon due for another.



(New York World)

He still thinks he can lift himself over. **How can he sell the surplus?**

Belladonna, digitalis, etc., lb.	3c	25%	10%
Cyannide potassium	10%	Free	Free
Ergot, lb.	10c	10c	10c
Ethyl acetate, lb.	3c	4c	5c
Ethyl chloride, lb.	15c	15c	20%
Ethyl ether, lb.	4c	6c	4c
Diethyl sulphate, lb.	15c	25%	20%
Other ethers	30%	25%	20%
Chestnut extracts	25%	11%	Free
Sumac extract	25%	Free	Free
Chlorophyll extract	25%	11%	15%
Dyewood extracts, lb.	25%	11%	⅛c
Other dyeing and tanning extracts	25%	11%	Free
Flavoring extracts	25%	25%	20%
Synthetic fruit flav's.	25%	25%	15%
Formalhehyde solution, lb.	2c	25%	1c
Formaldehyde solid, lb.	8c	25%	15%
Gelatin glue mfrs.	25%	25%	25%
Glycerine, crude, lb.	1c	1c	1c
Glycerine, refined, lb.	2c	3c	2c
Ink	30%	20%	15%
Iodine, lb.	20c	20c	Free
Bromine, lb.	5c	10c	Free
Bromine cpds., lb.	8c	10c	15%
Acetate of Lead—			
White, lb.	2½c	3¼c	1¼c
Brown, gray, yel., lb.	2c	2¼c	1c
Nitrate of lead, lb.	3c	2½c	1¼c
Lead arsenate, lb.	3c	30%	20%
Other lead compounds	30%	30%	20%
Licorice extracts, lb.	2c	25%	1c
Citrate of lime, lb.	6c	7c	1c
Magnesium carbon, lb.	1½c	2½c	1½c
Magnesium anhydrous, lb.	1c		
Magnesium chloride, lb.	½c	¾c	15%
Epsom salts, lb.	½c	½c	1-10c
Calcined Magnesia—			
Medicinal, lb.	7c	7c	3½c
Non-medicinal, lb.	¾c	¾c	3½c
Menthol, lb.	50c	25c	50c
Camphor, crude, lb.	1c	1c	1c
Camphor, refined, lb.	6c	6c	5c
Fish Oils—			
Cod, herring, menhaden, gal.	5c	8c	3c
Whale, gal.	6c	10c	5c
Seal, gal.	6c	10c	3c
Sperm, gal.	10c	10c	8c
Codliver, gal.	Free	12½c	Free
Other fish oils, gal.	5c	20%	3c
Wool grease, crude, lb.	½c	½c	¼c
Do, not crude, lb.	1c	1c	½c
Other animal oils	20%	20%	15%
Expressed Oils, lb—			
Castor	3c	4½c	12c
Cottonseed	3c	2c	Free
Cocoanut	4c	2c	Free
Soya bean	3c	2c	Free
Hempseed, gals.	1½c	1½c	3c
Linseed, gals.	3½c	2½c	10c
Olive, under 40 lbs., lb.	7½c	7½c	30c
Other olive, lb.	6½c	6½c	20c
Peanut, gals.	4c	2½c	6c
Poppyseed, gals.	2c	2c	6c
Rapeseed, gals.	6c	1½c	6c
Other expressed oils	20%	20%	15%
Alizarin	35%	25%	25%
Turkey red oil	35%	25%	25%
Castor oil soaps	35%	25%	15%
Soluble greases	35%	25%	25%
Hardened oils and fats, lb.	5c &20%	20%	Free
Oil combinations and mixtures	25%	25%	15%
Distilled oils—			
Lemon and orange	30%	20%	10%
Clove and eucalyptus	25%	25%	20%
Peppermint, lb.	25%	25%	25c
Patchouli	25%	25%	20%
Sandalwood	25%	25%	Free
Other distilled oils	25%	25%	20%
Opium—			
Crude, lb.	$3.00	$3.00	$3.00
Dried, lb.	$4.00	$4.00	$4.00
Opium, smoking	———	Prohibited	———
Morphine, oz.	$3.00	$3.00	$3.00
Cocaine, oz.	$2.60	$2.00	$2.00
Laudanum	60%	60%	60%
Other opium alkaloids, oz.	$3.00	$3.00	$3.00
Ambergris	20%	Free	20%
Musk, crude	20%	Free	20%
Civet, crude	20%	Free	20%
Vanillin, oz.	45%	35%	10c
Other perfume materials under 10% alcohol	45%	35%	20%
Same compounded with oils, lb.	40c & 50%	40c & 40%	20%
Perfumery—			
Alcoholic, lb.	40c & 60%	40c & 60%	40c & 60%
Non-alcoholic	60%	60%	60%
Floral waters	20%	20%	20%
Bay rum, lb.	40c	40c	$1.75 gal.
Paris green, lb.	2c	15%	Free
London purple, lb.	2c	15%	Free
Phosphorus, lb.	8c	10c	Free
Plasters, healing	25%	15%	15%
Court plaster	25%	15%	15%
Pigments, artist	40%	25%	20%
Paints, colors, stains	25%	25%	15%
Barytes ore, ton	$4	$4	15%
Barytes, manfrd., ton	$7.50	$7.50	20%
Blanc fixe, lb.	1c	1c	20%
Blue pigments, lb.	8c	12c	20%
Ultramarine blue, lb.	3c	3c	15%
Bone black, lb.	1c	20%	Free
Chromium colors	25%	25%	20%
Black pigments	20%	20%	15%
Lead pigments—			
Litharge, lb.	2½c	2⅞c	25%
Orange mineral, lb.	3c	2⅞c	25%
Red lead, lb.	2¾c	2⅞c	25%
White lead, lb.	2½c	2⅞c	25%
Other lead pigments	30%	30%	25%
Ochres, siennas, umbers:			
Crude, lb.	½c	¼c	5%
Ground, lb.	½c	½c	5%
Spanish brown	25%	20%	10%
Venetian red	25%	20%	10%
Indian red	25%	20%	10%
Satin white, lb.	½c	½c	20%
Varnishes—			
Under 5% alco., gal.	$2.20 & 25%	$2.20 & 25%	$1.32 &825%
Over 5% alco., gal.	25%	25%	10%
Other spirit varnishes	25%	25%	10%
Vermillion reds, lbs.	28c	33c	15%
Zinc oxide, dry, lb.	1¾c	1½c	10%
Zinc oxide, mixed, lb.	2¼c	2c	15%
Zinc sulphide mixtures, lb.	1¾c	1½c	15%
Potassium, lb.—			
Chromate	2¼c	2¼c	1c
Chlorate	2c	1c	½c
Perchlorate	2c	1c	15%
Ferricyanide	7c	7c	2c
Ferrocyanide	4c	4c	1¼c
Iodide	25c	25c	15c
Bromide	8c	10c	15%
Bicarbonate	1½c	25%	½c
Carbonate	¾c	25%	Free
Hydroxide	1c	25%	Free
Nitrate	½c	25%	$7 ton
Permanganate	4c	25%	1c
Santon salts, lbs.	75c	75c	Free
Castile soap	15%	15%	10%
Perfumed toilet soap	50%	30%	30%
Unperfumed toilet soap	10%	30%	10%
Medicinal soap	20%	30%	20%
All other soaps	5%	20%	5%
Sodium, lb.—			
Arsenate	1c	1c	Free
Bicarbonate	¼c	5%	¼c
Borate	⅛c	⅛c	⅛c
Bromide	8c	10c	15%
Carbonate	¼c	¼c	Free
Sal soda	¼c	¼c	½c
Chlorate	1½	1½c	½c
Chloride, pkgs., cwt.	20c	11c	Free
Chloride, bulk, cwt.	16c	7c	Free
Chromate	1¾c	1¾c	¼c
Formate	2c	25%	15¾
Ferrocyanide	2c	2c	¾c
Hydroxide	½c	½c	¼c
Nitrite	3c	3c	½c
Phosphate	½c	½c	¼c
Sesquicarbonate	¼c	¼c	½c
Sulphate, glauber's, ton	$1.00	$1.00	$1.00
Anhydrous sulphate, ton	$2.00	$2.00	45%
Sulphide under 35%	½c	¾c	¼c
Sulphide over 35%	¾c	¾c	¼c
Sodium silicate, lb.	½c	½c	Free
Sodium sulphites, lb.	½c	½c	¼c
Sodium thiosulphate, lb.	½c	½c	¼c
Sodium hydrosulphites	35%	35%	15%
Potato starch, lb.	2c	1½c	1c
Other starches, lb.	1c	1c	½c
Dextrine, potato, lb.	2½c	1⅞c	1¼c
Other dextrines, lb.	1¼c	1¼c	¾c
Strontium salts	25%	25%	15%
Strychnine, oz.	15c	15c	Free
Thorium salts	40%	25%	25%
Cerium salts	45%	25%	15%
Gas mantle scrap	45%	25%	10%
Tin salts	25%	20%	10%
Titanium salts, lb.	30%	25%	15%
Vanilla beans, lb.	30c	30c	30c

Tonka beans, lb.....	25c	25c	25c
Zinc chloride	1 3-10c	1 3-10c	½c
Zinc sulphate, lb.....	1½c	1½c	½c
Zinc sulphide, lb.....	1½c	1½c	15%

SCHEDULE II

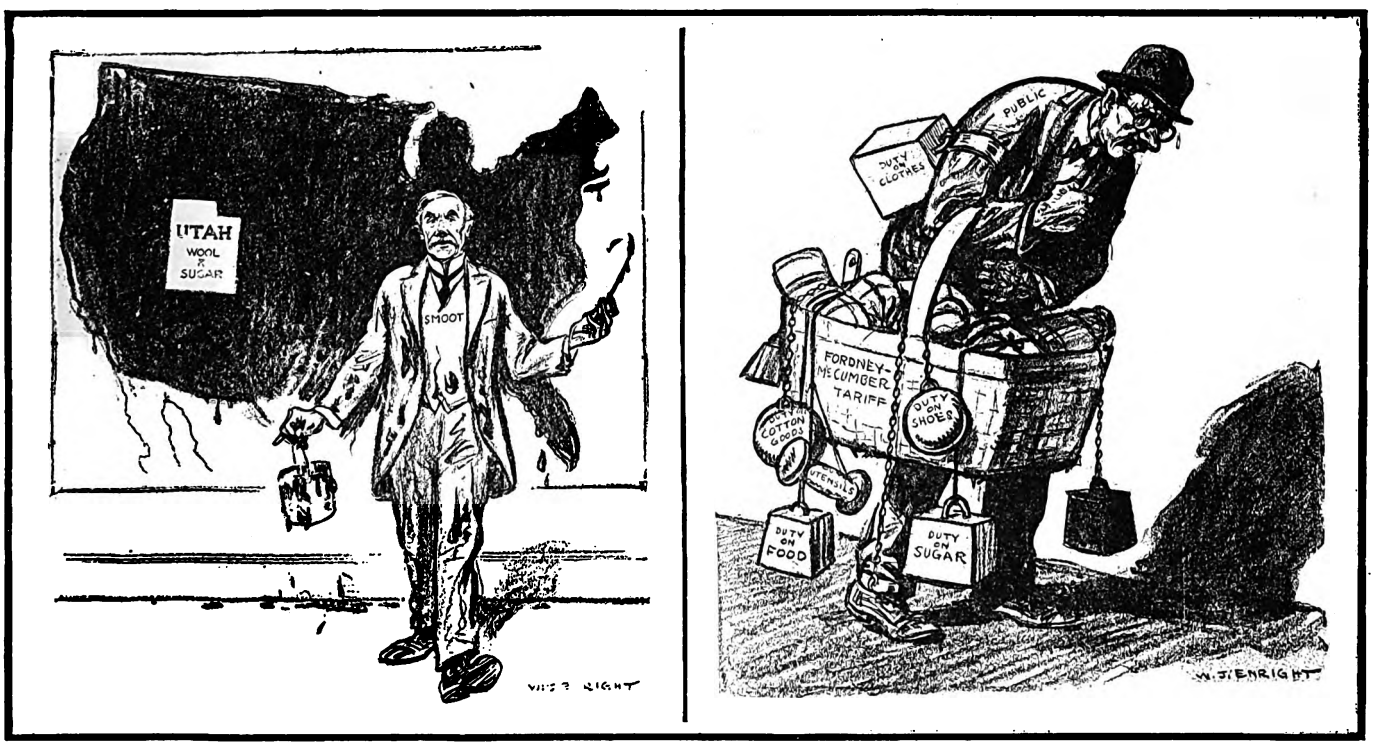
EARTHS, EARTHENWARE AND GLASSWARE

Bath brick	25%	23%	15%
Magnesite brick, lb.....	¼c & 10%		
All other brick.....	25%	15%	10%
Tiles, unglazed—			
Value under 40c sq. ft. (sq. ft.)	8c	8c	1½c
Value over 40c sq. ft. (sq. ft.)	50%	38%	1½c
Tiles, glazed—			
Value under 40c sq. ft. (sq. ft.)	8c	8c	5c
Value over 40c sq. ft. (sq. ft.)	50%	38%	5c
Tile mantles, etc.	50%	38%	30%
Quarry tiles, sq. ft.....	5c	3c	20%
Limestone, c'ushd, cwt..	5c	5c	Free
Lime, cwt.	10c	10c	5%
Hydrated lime, cwt.....	12c	12c	5%
Crude magnesite, lb....	½c	½c	Free
Calcined magnesite, lb..	¾c	¾c	Free
Grain magnesite, lb.....	¾c	¾c	Free
Plaster rock, crude, ton.	25c	25c	10%
Do, ground, ton.....	$1.40	$1.40	10%
Non-staining Portland cement, cwt.	8c	8c	10%
Keene's cement—			
Value under $14 ton,	$3.50	$3.50	10%
Value $14-20 ton, ton.	$5.00	$5.00	10%
Value $20-40 ton, ton.	$10.00	$10.00	10%
Value over $40 ton, ton	$14.00	$14.00	10%
Pumice stone, unmfd.—			
Value under $15 ton, lb.	2-10c	1-10c	5%
Value over $15 ton, lb.	¼c	3-10c	5%
Pumice stone—			
Manufactured, cwt.,	55c	55c	¼c lb.
Products	35%	26%	25%
Clay, unmfd., ton.....	$1	$1	50c
Clay, mfd., ton.....	$2	$2	$1
China, clay, ton.....	$2.50	$2.50	$1.25
Bauxite, ton	$1	$1	Free
Fuller's earth—			
Raw, ton	$1.50	$1.50	75c
Manufactured, ton ...	$3.25	$3.00	$1.50
Silica, crude, ton.....	$4.00	$4.00	Free
Pigment silica, ton.....	$7.50	$7.50	Free
Glass sand, ton	$1.50	$4.00	Free
Fluorspar, ton	$5.60	$5.00	$1.50
Mica, unmanufactured—			
Under 15c lb., lb.....	4c	4c & 17%	4c
Over 15c lb., lb.....	25%	4c & 17%	25%
Mica, cut, lb.....	30%	10c & 17%	30%
Mica, plates, lb.....	40%	10c & 17%	30%
Ground mica, lb.....	20%	4c & 20%	15%
Talc, soapstone, lb.....	25%	¼c	Free
French chalk—			
Crude, lb.	¼c	¼c	Free
Ground, lb.	½c	½c	15%
Cut, lb.	1c	1c	20%
Talc manufactures	35%	25%	20%
Decorated talc mfgs.....	45%	30%	25%
Earthenware—			
Com. yellow & brown..	15%	20%	15%
Dec. yellow & brown..	40%	20%	20%
Rockingham ware	25%	20%	30%
Stoneware crucibles ..	25%	20%	15%
Graphite, amorphus	10%	10%	Free
Graphite, lump	20%	10%	Free
Graphite, flake, lb.....	2c	10%	Free
Non-vitrefied earthenware—			
Plain	45%	25%	35%
Ornamented	50%	28%	40%
China, porcelain, etc.—			
Plain	60%	35%	50%
Ornamented	70%	40%	55%
Mineral ware—			
Plain	35%	21%	20%
Decorated	45%	28%	25%
Gas retorts	20%	15%	10%
Lava burner tips, gross..	10c & 15%	35%	15%
Gas mantle supporters...	35%	35%	15%
Carbons and electrodes..	45%	35%	30%
Glass bottles—			
Over 1 pint, lb.....	1c	1c	30%
¼-1 pint, lb.....	1½	1½c	30%
Under ¼ pint, gross..	50c	50	30%
Table glassware	65%	40%	45%
Cylinder, crown and sheet glass, unpolished, lb.—			
Under 150 sq. in.	1¼c	1¼c	⅞c
150-384 sq. in.....	1⅜c	1⅜c	1c
384-720 sq. in.....	2¼c	2¼c	1⅝c
720-864 sq. in.....	1¾c	2¾c	1½c
864-1200 sq. in.....	2c	3¼c	1⅝c
1200-2400 sq. in.....	2¼c	3¾c	1⅞c
Over 2400 sq. in.....	2½c	4c	2c
Cylinder, crown and sheet glass, polished, sq. ft.—			
Under 384 sq. in.....	4c	5c	3c
384-720 sq. in.....	6c	6c	4c
720-1440 sq. in.....	12c	12c	7c
Over 1440 sq. in.....	15c	15c	10c
Rough plate glass—			
Under 384 sq. in.....	1c	1c	½c
Over 384 sq. in.....	1½c	1½c	1c
Cast polish plate glass—			
Under 384 sq. in.....	12½c	11c	6c
384-720 sq. in.....	15c	12½c	8c
Over 720 sq. in.....	17½c	20c	12c
Wire netting plate glass—			
Under 384 sq. in.....	15c	12c	6c
384-720 sq. in.....	17½c	15c	8c
Over 720 sq. in.....	20c	25c	12c
Silvered plate glass—			
144-384 sq. in.....	13½c	11c	7c
384-720 sq. in.....	16c	13c	9c
Over 720 sq. in.....	21c	22½c	13c
Spectacles, eyeglasses—			
Under 65c doz.....	20c & 15%	20c & 15%	35%
65c-$2.50 doz.	60c & 20%	60c & 20%	35%
Over $2.50 doz.....	40%	40%	35%
Glass lenses—			
Unground edges	40%	40%	25%
Ground edges, doz. pr..	10c & 35%	10c & 35%	25%
Magic lantern strips.....	35%	35%	25%
Optical glass	45%	35%	Free
Surveying instruments, telescopes, microscopes, photographic lenses....	45%	35%	25%
Light bulbs	20%		
Opera & field glasses....	55%	35%	35%
Stain glass windows.....	60%	30%	30%
Other glass manufrs.....	60%	30%	30%
Ceramic colors—			
Ground	30%	23%	15%
Other forms	40%	35%	15%
Opal glass tiles	40%	35%	30%
Clock dial enamel.....	40%	35%	Free
Marble breccia, onyx—			
Rough, cu. ft.....	63c	65c	50c
Sawed 2 in. thick. cu. ft.	$1	$1	75c
Sawed 1-1½ in. thick, ft.			
Sawed, 1½-2 in. thick, ft.	10c	10c	8c
In loose cubes, lb....	13c	13c	10c
	¼c & 20%	¼c & 17%	20%
In attached cubes, ft..	5c & 35%	5c & 26%	35%
Marble, breccia, onyx, alabaster, jet vases, monuments, benches, etc., except jewelry	60%	40%	45%
Burr stones	15%	13%	Free
Curling stones	50%	40%	Free
Freestone, granite, sandstone, limestone, and other building or monument stone dressed....	50%	40%	25%
Same, not dressed, cu. ft.	15c	15c	3c
Grindstones, ton	$1.75	$2.00	$1.50
Slate manufactures	15%	17%	10%
Watch crystals	60%	40%	30%

SCHEDULE III.

METALS AND MANUFACTURES OF METALS.

Pig iron, ton	75c	$1.25	Free
Scrap iron & steel, ton..	75c	$1.00	Free
Manganese ore, lb., on manganese content....	1c		
Molybdenum, lb.	35c	75c	Free
Tungsten ore, lb., on molybdenum content...	45c	45c	Free
Ferromanganese, lb.	1⅞c	2.2c lb	Free
Manganese metal., lb., on manganese content			



My country 'tis for thee.

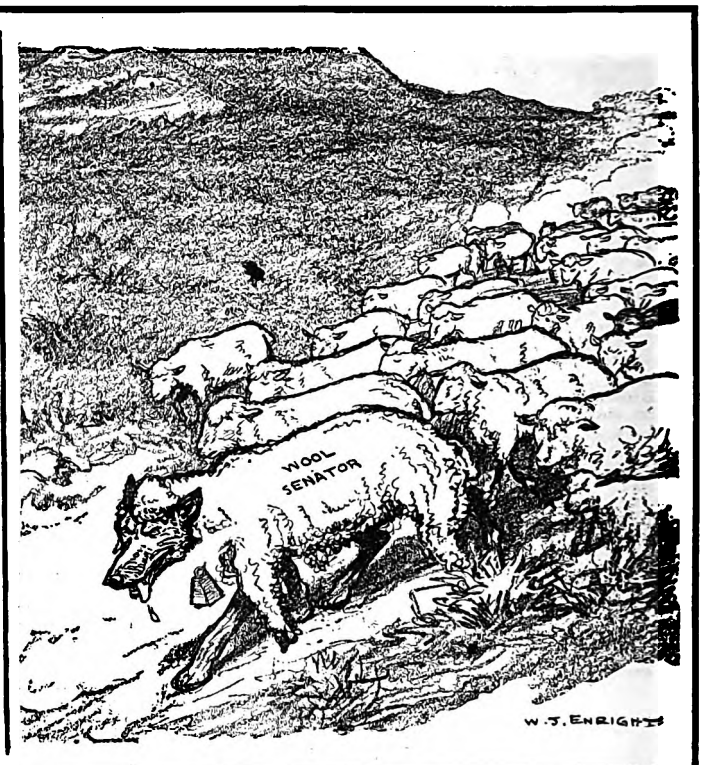
Carrying it home.

(New York World)



(New York World)

Little Woolie shall be protected.



(Newark Evening News)

The bell-wether.

Ferromolybdenum, lb....	50c & 15%	$1.00 & 17%	13%
Tungsten comp'ds, lb....	60c & 25%	72c & 15%	15%
Tungsten alloys, lb.....	60c & 25%	72c & 15%	15%
Ferrosilicon—			
8-30% Si., lb.....	2c	2½c	15%
30-60% Si., lb.....	2½c	2¾c	15%
60-80% Si., lb.....	3c	3 1-5c	15%
80-90% Si., lb.....	4c	4c	15%
Over 90% Si., lb.....	8c	8c	15%
Ferrochrome—			
3% C., lb.	3½c	3½c	15%
Under 3% C.....	30%	30%	15%
Other steel alloys.....	25%	30%	15%
Cerium metal, lb.....	$2.00	30%	15%
Cerium alloys, lb.....	$2.00 & 25%	30%	15%
Ductile tantalum	40%		
Bar iron, lb.	2-1½c	2-1c	5%
Steel ingots, etc., lb.....	2½c to 20%	2c to 20%	Free
Steel bars, lb.	2c to 25%	2c to 20%	15%
Steel circular saw plates, lb.	¼c	¼c	12½%
Boiler plate, lb.	7.20c up to 20%	7.20c up to 20%	12%
Sheet iron or steel, lb...	0.45c up to 20%	0.45c up to 20%	12%
Coated iron or steel sheets, lb.	0.2c	0.2c	15%
Structural steel	20%	25%	10%
Hoop & band steel, lb...	0.25c to 25%	0.25c to 20%	10%
Coated, do., lb.....	¼c	¼c	Free
Wire rods, lb.....	0.3-0.6c	0.3-0.6c	10%
Steel wire, lb.....	¾c to 35%	¾c to 30%	10% 25%
Galvanized wire, lb.	½c	½c	15%
Woven wire cloth.....	25-45%	20-40%	15-20%
Anchors	25%	25%	12%
Electric storage batteries.	40%	30%	*
Anti-friction balls, lb....	10c & 55%	10c & 35%	35%
Railroad fish plates, lb..	¼c	¼c	10%
Other railroad bars, lb...	7.40c	7.40c	Free
Steel axles, lb.....	0.6c	0.6c	10%
Steel R. R. wheels, lb...	1c	1c	20%
Jeweler's anvils	45%	1½c lb.	15%
Other anvils, lb.....	1½c	1½c	15%
Blacksmith tools lb.....	1¼c	1¼c	10%
Cast iron pipe	20%	10%	10%
Seamed steel tubes, lb..	¾-1¼c	¾-1¼c	20%
Tubular tanks	30%	20%	20%
Flexible metal tubing....	35%	25%	20%
Chains, lb.	1-4c	1-4c	20%
Machine chains	35%	30%	25%
Nuts and washers, lb. ...	6c	6c	5%
Bolts, lb.	1c	1c	10%
Spiral nut locks	40%	30%	30%
Cut nails & spikes, lb....	4c	4c	Free
Cut tacks and brads....	15%	20%	Free
Horseshoe nails, lb.....	2½c	2c	Free
Wire nails, lb.....	1½c	4¾c	Free
Spikes, tacks and staples, lb.	6c	6c	Free
Rivets and studs	30%	25%	20%
Other steel rivets, lb.....	1c	1c	20%
Common horseshoes, lb..	1-5c	6c	Free
Drilled horseshoes, lb....	1c	6c	Free
Steel wool & shavings...	10c & 30%	10c & 30%	20%
Iron or steel grit, lb....	¾c	1c	30%
Corset steel	35%	25%	15%
Steel card clothing.....	45%	35%	35%
Wood screws, lb.....	25%	3-10 gr.	25%
Iron, steel, household-ware, lb.	5c & 30%	5c & 30%	25%
Aluminum householdware, lb.	15c & 60%	28%	25%
Copper & brass house-holdware	50%	35%	20%
Cross cut saws	30%	15%	12%
Jewelers' saws, gross....	40c	40c	12%
Steel printing plates.....	25%	15%	15%
Lithographic plates	30%	20%	25%
Umbrella ribs	50%	35%	35%
Needles, per M.....	$1.15 & 40%	$1.15 & 25%	20%
Latch needles, per M....	$2.00 & 50%	$2.00 & 35%	20%
All other needles.....	45%	30%	20%
Fishing tackle	45%	35%	30%
Harness hardware	35%	35%	Free
Metal buckles, per C....	5-15c & 20%	5-15c & 20%	15%
Metal hooks and eyes, lb.	4½c & 25%	4½c & 15%	15%
Bridle hardware	50c-60c & 20%		
Snap fasteners and clasps.	55%	40%	15%
Metal trouser buttons, gross	1-12c	1-12c	15%
Steel trouser buttons, gross	¼c	¼c	15%
Pins	35%	28%	20%
Metallic pens, gross.....	12c	12c	8c
Penholders, gross	25c & 20%	25c & 20%	25%
Mechanical pencils, gross.	45c & 20%	45c & 20%	25%
Fountain pens, doz.....	72c & 40%	72c-$1.50 & 25%	25%
Knives, folding blades...	2-40c & 60%	40% to 30c & 30%	35-55%
Knives, fixed blades.....	20-20c & 45%	8-16c & 35%	25-30%
Scissors and shears.....	10c to 20c & 45%	10 & 30% to 20c & 35%	30%
Razors	10-50c & 50%	10-20c & 30%	35-55%
Surgical instruments, doz.	35-45%	60c-$1 & 35%	20-50%
Laboratory instruments..	35%	40%	Free
Nippers and pliers	60%	8-12c & 25%	30%
Files, doz.	25-77½c	25-77½c	25%
Swiss pattern files, doz..	50%	25-77½c	25%
Sword blades	50%	40%	30%
Muzzle loading guns and rifles	25%	20%	15%
Breech loading guns and rifles	$1.50-$10 & 45%	$1.50-$10 & 35%	35%
Breech loading gun barrels	$4.00 & 50% $5.00	$4.00 & 50% $5.00	35% 35%
Breech loading stocks....	& 50%	& 50%	
Breech Loading Parts...	55%	45%	35%
Pistols	$1.25-$3.50 & 60%	$1.25-$3.50 & 25%	35%
Watch movements	$10.75	$1.25-$10.75	30%
Watch cases and parts...	50%	35%	30%
Watch & clock jewels...	10%	10%	10%
Enamel dials	3c & 50%	3c & 35%	30%
Clocks and clock movement	50%	35%	30%
Same with jewels	$1-$3 & 50%	$1-$3 & 35%	30%
Clock parts	55%	40%	30%
Automobiles and parts...	25%	25%	30-45%
Airplanes and motorboats.	30%	30%	*
Bicycles	30%	30%	25%
Motorcycles	25%	30%	25%
Steam engines and locomotives	15%	15%	15%
Sewing machines, under $75	25%	Free	Free
Sewing machines, over $75	40%	Free	Free
Cash registers	25%	Free	Free
Printing presses	15%	35%	15%
Embroidery machines ...	30%	35%	25%
Textile machinery	35-50%	35%	25%
Centrifugal machines ...	25%		
Typewriters	30%		
All other machines.....	30%	35%	25%
Shovels	35%	25%	20%
Aluminum, crude, lb....	5c	5c	2c
Aluminum, plates, bars, etc., lb.	9c	9c	3½c
Magnesium, metallic, lb.	10-20c	$1	25%
Magnesium, alloys, lb...	50c	$1	25%
Antimony metal, lb.....	2c	1½c	10%
Bismuth	7½c	Free	Free
Cadmium, lb.....	15c	Free	Free
Liquated antimony, lb...	¾c	Free	Free
German silver	20%	20%	15%
Nickel silver	30%	20%	15%
Copper rolls, lb.....	2½c	2½c	5%
Copper, engrs., plts., not grd. lb.	7c	7c	5%
Ground, lb.	11c	11c	5%
Brass rods, etc., lb.....	4c	4c	20%
Seamless brass tubing, lb.	8c	8c	20%

Brazed brass tubes, lb...	12c	12c	20%
Bronze rod and sheets, lb.	4c	4c	20%
Bronze tubes, lb.....	8c	8c	20%
Bronze powder, lb.....	16c	16c	35%
Bronze leafs, lb.....	8c	8c	25%
Golf leaf, per 100.....	60c	50c	35%
Silver leaf per 100.....	5c	5c	30%
Tinsel wire, lb.....	5c & 10%	10c & 30%	6%
Tinsel bullion, lb.....	5c & 35%	10c & 35%	25%
Tinsel ribbons	45%	45%	40%
Tinsel fabrics	55%	55%	40%
Quicksilver, lb.	25c	35c	10%
New types	25%	15%	15%
Nickel—			
In pigs, lb.....	3c	5c	10%
Bars and sheets.....	25%	30%	20%
Tin in bars & pigs.....	Free	2c lb.	Free
Plain bottle caps.....	30%	25%	30%
Decorated bottle caps....	45%	40%	40%
Lead bearing ores, lb....	1½c	1½c	¾c
Lead—			
Bullion and pigs, lb..	2⅛c	2⅛c	25%
In sheets, lb.....	2⅜c	2⅜c	25%
Zinc bearing ore—			
Under 10% Zn.....	Free	Free	10%
10-20% Zn., lb.....	½c	½c	10%
20-25% Zn., lb.....	1c	1c	10%
Over 25% Zn., lb.....	1½c	1½c	10%
Zinc—			
In pigs, lb.....	1¾c	1⅜c	15%
In sheets, lb.....	2c	1¾c	15%
In plated sheets, lb...	2¼c	1¾c	15%
Old, lb.	1½c	1c	15%
Print rollers & blocks...	60%	30%	20-50%
Steel rolls, lb.....	25c & 20%		
Cutting tools	60%		
Other metal articles or wares	40%	35%	20-50%

SCHEDULE IV.

WOOD AND MANUFACTURES OF WOOD

Timber, hewn, cu. ft....	Free	1c	Free
Fir, spruce, cedar or hemlock logs, M ft.....	Free	$1	Free
Brier root	10%	10%	10%
Cedar, mahogany and other cabinet woods, rough	Free	10%	Free
Cabinet woods, sawed...	15%	15%	10%
Veneers	20%	20%	15%
Paving posts, R. R. ties, telegraph poles	Free	10%	10%
Hubs and wagon blocks..	10%	10%	Free
Picket palings, hoops....	Free	10%	Free
Shingles, per M.....	Free	50c	Free
Empty casks, barrels, hogsheads and boxes..	15%	15%	15%
Boxes containing oranges, lemons, limes, grape fruit	25%	20%	15%
Rattan, reeds	15%	20%	10%
House or cabinet furniture	60%	50%	15%
Split bamboo furniture, lb.	1c	2c	15%
Basket makers' willow...	35%	25%	25%
Other rattan, bamboo or willow articles	40%	40%	25%
Toothpicks	25%	25%	25%
Butchers' skewers, M....	25c	25c	10c
Porch & window blinds..	45%	25%	20%
Stained	50%	30%	25%
Clothes pins, gross	15c	25%	15%
Other wood manufactures	35%	25%	15%

SCHEDULE V.

SUGAR, MOLASSES AND MANUFACTURES OF

Sugars, syrups, molasses—			
50-75 degrees, lb.....	1¼c	1.16c	0.71c
Each add. degree, lb..	0.05c	0.04c	0.026c
Molasses and syrups—			
Under 48% sugar, gal..	¼c	¼c	15%
Over 48% sugar, each additional per cent..	0.275c	0.275c	4¼c gal.
Maple sugar and syrup, lb.	4c	4c	3c
Dextrose syrup, lb.....	1½c	1½c	1¼c
Sugar cane, ton.....	$1	$1	15%
Salicin	50%	50%	Free
Saccharides	50%	50%	15%
Sugar candy and all other confectionery	40%	30%	2c lb to 25%

SCHEDULE VI.

TOBACCO AND MANUFACTURES OF

Wrapper and filler tobacco, unstemmed, lb.	$2.10	$2.10	$1.85
Stemmed, lb.	$2.75	$2.75	$2.50
Cheaper filler tobacco—			
Unstemmed, lb.	35%	45%	35%
Stemmed, lb.	50c	60c	50c
All other tobacco, lb. ...	55c	55c	55c
Scrap tobacco, lb.	35c	55c	35c
Snuff, lb.	55c	55c	55c
Tobacco stems, lb.	55c	55c	Free
Cigars, cigarettes, cheroots, lb.	$4.50 & 25%	$4.50 & 25%	$4.50 & 25%

SCHEDULE VII.

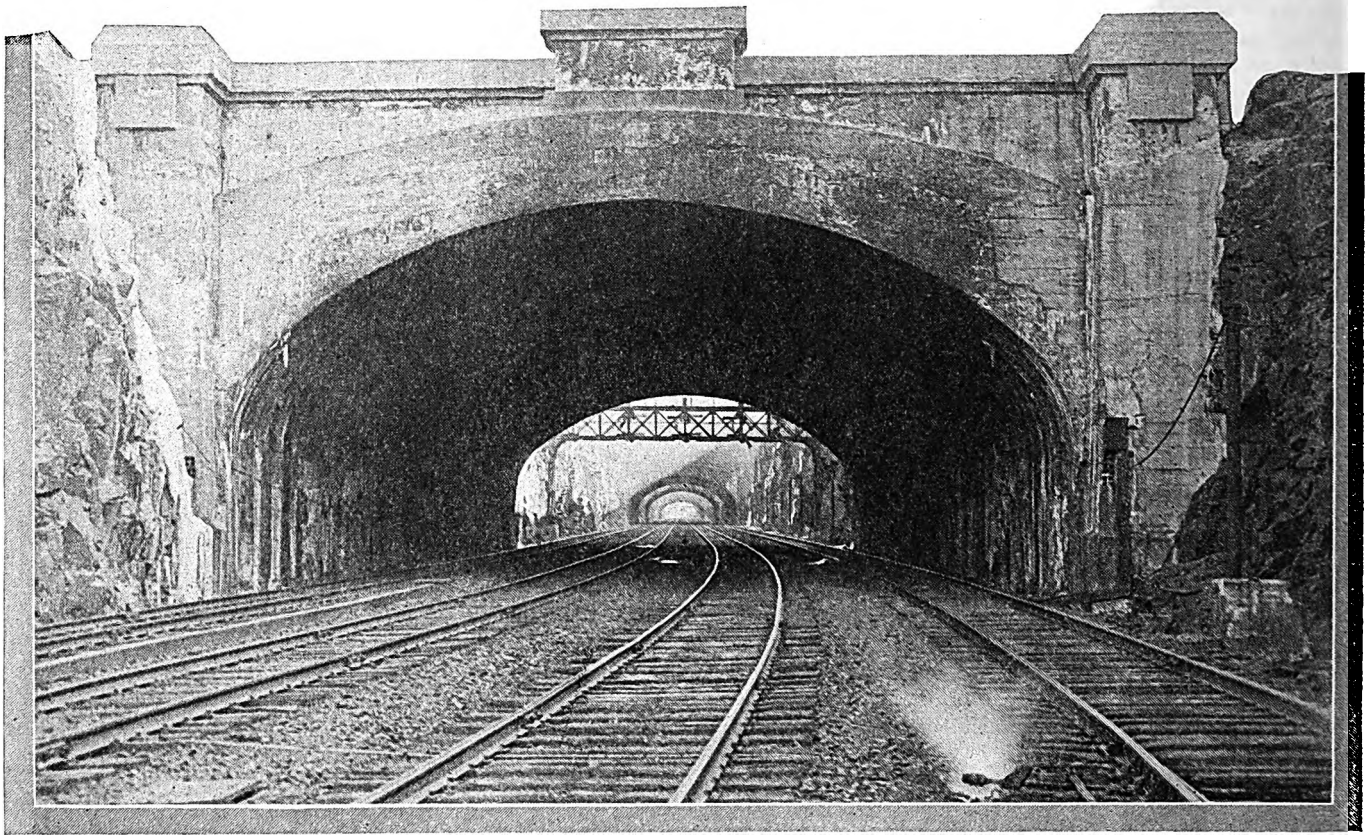
AGRICULTURL PRODUCTS AND PROVISIONS

Cattle—			
Under 1,050 lb., lb. ..	1½c	1¼c	Free
Over 1,050, lb., lb.	2c	1¼c	Free
Fresh beef & veal, lb...	3½c	2c	Free
Tallow, lb.	½c	½c	Free
Oleo oil, lb.	1c	1c	Free
Sheep and goats, lb.	$2 head	1c	Free
Fresh mutton & goat meat, lb.	2½c	1¼c	Free
Fresh lamb. lb.	5c	2c	Free
Swine, lb.	½c	½c	Free
Fresh pork, lb.	¾c	¾c	Free
Bacon, hams and shoulders, lb.	2c	1¼c	Free
Lard, lb.	1c	1c	Free
Lard compounds, lb.	5c	20%	Free
Reindeer meat, lb.	4c	20%	Free
Venison & game animals, lb.	4c	1½c	1½c
Extract of meat, lb.	15c	15c	10c
Fluid extract of meat, lb.	15c	15c	5c
Other meats	20%	15%	Free
Fresh milk, gal.	2½c	1c	Free
Sour and buttermilk, gal.	1c	½c	Free
Cream, gal.	22½c	5-10c	Free
Condensed milk—			
Unsweetened, lb.	1c	1c	Free
Sweetened, lb.	1½c	1½c	Free
All other, lb.	1⅜c	1¾c	Free
Milk powder, lb.	3c	3c	Free
Cream powder, lb.	6c	8c	Free
Malted milk	20%	20%	Free
Butter & oleom, lb.	8c	8c	2½c
Cheese—			
Under 30c lb., per lb...	5c	5c	20%
Over 30c lb., per lb....	25%	25%	20%
Substitutes, lb.	5c	5c	20%
Live poultry, lb.	3c	2c	1c
Live birds—			
Under $5, each.....	50c	50c	Free
Over $5	20%	20%	Free
Dead poultry, lb.	6c	4c	2c
Dead birds, lb.	8c	20%	30%
Preserved birds and poultry, lb.	35%	22%	2c
Poultry eggs in shell, doz.	8c	6c	Free
Frozen eggs, lb.	6c	4c	1-2c
Dried eggs, lb.	18c	15c	10%
Dried eggs albumen, lb.	18c	15c	3c
Horses and mules—			
Under $150, head.....	$30	$30	10%
Over $150	20%	20%	10%
Black or silver foxes, head		$350	10%
Other live animals	15%	15%	10%
Honey, lb.	3c	2½c	10c gal.
Fresh water fish, lb.	2c	1c	Free
Salmon, pickled	25%	25%	15%
Finnan haddie	25%	25%	Free
Dried fish, lb.	1¾c	1¾c	Free
Smoked herring, lb.	2½c	2½c	¾c
Salt herring and mackerel, lb.	1c	1½c	Free
Fish in oil	30%	26%	25%
Fish in packages	25%	20%	15%
Crab meat	15%	26%	Free
Fish sauce	30%	30%	25%
Caviar and other roe...	30%	28%	30%
Barley, bush	20c	15c	15c
Barley malt, cwt.....	40c	40c	15c bu
Barley flour, lb.....	2c	2c	1c
Buckwheat, cwt.....	10c	30c	Free
Buckwheat flour, lb.....	½c	½c	Free
Corn, bush.	20c	15c	Free
Corn meal, cwt.....	30c	30c	Free
Macaroni & noodles, lb..	2c	1½c	1c
Oats, bush.	15c	10c	6c
Oatmeal, cwt.	90c	60c	30c
Paddy rice, lb.	1c	1c	⅜c
Brown rice, lb.	1¼c	1¼c	⅝c
Milled rice, lb.	2c	2c	1c
Rice meal and bran, lb...	½c	1c	¼c
Rye, bush.	15c	10c	Free
Rye flour & meal, cwt...	45c	30c	Free
Wheat, bush.	30c	25c	Free
Wheat flour, cwt.	78c	50c	Free
Wheat bran	10%	15%	Free
Hulls of oats, barley, buckwheat, cwt.	10c	10c	8c
Brewers' grains, ton....	$5	$5	Free
Cereal breakfast foods..	25%	17%	Free
Biscuits and cakes.....	30%	28%	25%
Bread		Free	Free
Apricots dried, lb.....	½c		
Apricots preserved	40%		
Apples, bush.	30c	25c	10c
Dried apples, lb.	2c	2c	1c
Preserved apples, lb. ..	2½c	2½c	20%
Bananas, bunch	Free	2c	Free
Banana flour, cwt.	Free	4c	1c
Berries, lb.	1½c	1c	½c
Cranberries, lb.	1¼c	1c	10%
Dried berries, lb.	2½c	2½c	1c
Preserved berries	35%	20%	20%
Cherries, lb.	2c	1½c	10c bu
Maraschino cherries.....	45%	20%	20%
Cider, gal.	5c	10c	2c
Vinegar, gal.	6c	6c	4c
Citrons, lb.	2c	2c	Free
Candied citrons, lb.	5c	4c	2c
Orange & lemon peel, lb.	2c	2c	2c
Candied orange peel, lb..	5c	2c	2c
Figs, lb.	2c	2c	2c
Preserved figs	40%	20%	20%
Grapes, cu. ft.	25c	25c	25c
Dates, lb.	1c	1c	1c
Preserved dates, lb.....	35%	1c	1c
Raisins, lb.	2½c	2c	2c
Dried grapes, lb.	2½c	2½c	2c
Lemons, lb.	2c	2c	½c
Limes and oranges, lb....	1c	1c	½c
Grape fruit	1c	1c	½c
Olives, gal.	20c	20c	15c
Stuffed olives, gal.	30c	30c	15c
Dried olives, lb.	4c	4c	15c
Peaches and pears, lb...	½c	½c	10c
Dried peaches and pears, lb.	2c	1c	1c
Preserved peaches & pears	40%	20%	20%
Pineapples, crate	22½c	¾c each	6c cu. ft.
Do., in bulk, each....	¾c	¾c	$5 pr M
Preserved pineapples, lb..	2c	3¾c	20%
Plums and prunes, lb...	½c	½c	1c
Preserved plums	40%	20%	20%
Jellies, jams, marmalades	40%	28%	20%
Pickled fruits	40%	28%	25%
Other preserved fruits..	40%	20%	20%
Tulip bulbs, per 1,000...	$2	$4	$1
Hyacinth bulbs, 1,000....	$4	$4	$2.50
Crocus bulbs, 1,000.....	$1	$1	$0.50
Lily bulbs, 1,000.....	$2	$4	$5
Other bulbs	30%	20%	50c p M.
Cut flowers	40%	25%	25%
Rose seedlings, p. 1,000..	$2	$2	$1
Nursery stock	30%	20%	15%
Fruit tree stocks, 1,000..	$2	$2	$1
Fruit vine stocks	30%	20%	15%
Unshelled filberts, lb....	2½c	2½c	2c
Shelled almonds, lb.....	15c	12c	4c
Brazil nuts, lb.	1c	1c	1c
Unshelled filberts, lb....	2½c	2½c	2c
Shelled filberts, lb.....	5c	5c	4c
Chestnuts, lb.	Free	½c	1c
Pistache nuts, lb.	1c	1c	1c
Coconuts, each	½c	½c	Free
Coconut meat, lb.	2½c	4½c	2c
Unshelled peanuts, lb....	3c	3c	½c
Shelled peanuts, lb.....	4c	4c	¾c
Unshelled walnuts, lb....	4c	4c	2c
Shelled walnuts, lb.....	12c	7½c	4c
Unshelled pecans, lb.....	1c	1c	1c
Shelled pecans, lb.....	2c	2c	1c
Other edible nuts, lb.....	1c	1c	1c
Nut paste, lb.....	15c		
Oil bearing seeds—			
Castor beans, lb.....	½c	½c	15c bu
Flaxseed, bush.	40c	25c	20c
Poppy seed, cwt.....	32c	32c	15c bu
Sunflower seed, lb.....	2c	2c	3c
Apricot and peach kernels, lb.	3c	3c	3c
Grass seeds, lb.....	¼c	1-3c	Free
Garden and field seeds, lb.	1-25c	1-20c	Free to 10c
Beans, lb.	½c	½c	25c bu
Dried beans, lb.....	2c	1¾c	Free
Sugar beets, ton.....	80c	80c	5%
Other beets	17%	17%	5%
Lentils, lb.	½c	2c	25c bu
Mushrooms, lb.....	45%	33⅓%	2½c
Truffles, lb.....	25%	25%	2½c
Peas, lb.....	1c	75c cwt	10c bu
Split peas, lb.....	1¼c	1c	20c bu
Preserved peas, lb.....	2c	2c	1c
Onions, lb.....	1c	75c cwt	20c bu
Garlic, lb.	2c	2c	1c
Irish potatoes, cwt.....	58c	42c	Free
Dried potatoes, lb.....	2¾c	3½c	Free
Potato flour, lb.....	3c	1½c	Free & 10%
Tomatoes, lb.	1c	1c	15%
Preserved tomatoes	15%	10%	25%
Turnips, cwt.	12c	12c	15%
Other natural vegetables	30%	20%	15%
Preserved vegetables ..	35%	25%	25%
Broom corn, ton.....	Free	$2	Free
Acorns, lb.	1½c	1½c	Free
Chicory, lb.	1½c	1½c	1c
All coffee substitutes, lb..	3c	3c	2c
Chocolate and cocoa—			
Under 20c lb., lb.....	25%	17½%	8-25%
Over 20c lb., lb.....	25%	17½%	8-25%
Cocoa butter, lb.....	17%	3½c	3c
Candied ginger, lb.....	20%	15%	1c
Hay, ton	$4.00	$4.00	$2.00
Straw, ton	$1.50	$1.00	50c
Hops, lb.	24c	24c	16c
Hop extract, lb.....	$2.40	$1.50	50%
Lupulin, lb.	75c	75c	50%
Anise seed, lb.....	2c	2c	2c
Caraway seed, lb.....	1c	1c	1c
Cassia, lb.	2c	2c	1c
Ground cassia, lb.....	5c	5c	1c & 20%
Unground cloves, lb.....	3c	3c	2c
Ground cloves, lb.....	6c	6c	2c & 20%
Unground cinnamon, lb..	2c	2c	1c

(Turn to page 1518)

Is a Freight Tie-up Coming?

Or will the railroads manage to handle fall traffic without difficulty?



AS the fall season approaches it seems more and more likely that the railroads will be overstrained by the stocks of food products, coal and manufactures that soon will be stacked in their freight stations. Perhaps the overstrain will not lead to a tie-up; but if uncomfortable congestion is avoided it will be due either to unprecedented efficiency on the part of the roads or to the failure of the rush of freight to come up to present expectations.

It is hard to get figures which show clearly how many cars will be available to meet the rush, and what condition those cars will be in. The railroads control the sources of statistics; and naturally they are anxious to make it appear that their equipment has not been damaged seriously by the strike, and that they will handle the coming situation with glorious efficiency. Impartial observers, however, are not quite so hopeful.

The *Brookmire Economic Service,* for instance, points out that the longer the shopmen's strike lasts the deeper will be its effect upon the available supply of cars for the fall. This must be considered, the *Service* says, in connection with the heavy coal shipments now being started, the unusually large crop movement, and the increase in manufacturing activity that most factories expect or have already felt.

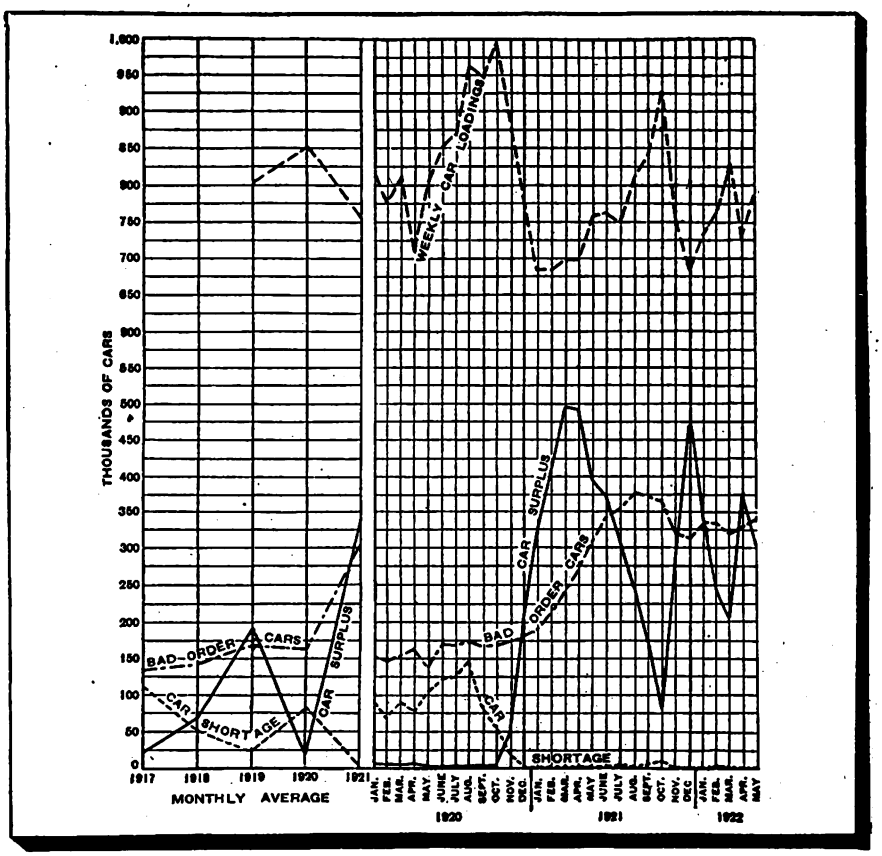
"For the rest of the year the average weekly requirements for hauling coal will be approximately 225,000 cars a week," the *Service* says. "This is spread out theoretically according to the seasonal variation of bituminous coal mining. As a matter of fact in the present depleted state of coal supplies and with the busy fall season coming on there will probably be an immediate rush which will tend to increase the normal shipments of September and October. At the beginning of June there were approximately 505,000 idle cars of which number 305,000 were in serviceable condition. Increased freight loadings in general have probably brought the serviceable cars down to around 275,000. If the shopmen's strike lasts for any length of time, cars in need of repair will make some inroads upon the latter figure.

"Since the coal strike the average weekly shipments of coal have approximated 85,000 cars. If the resumption of work in the mines should bring the estimated average weekly movements to 225,000, it would increase the requirements for transit facilities by 140,000 cars a week from this one factor alone. This does not take into consideration any of the requirements which will be made by reason of suspended anthracite shipments, a factor which is not negligible. This increased demand will be concurrent with the heavy requirements for crop movements and seasonally higher demands of the fall. From all reliable reports stocks of goods carried by second hands are generally low and an increase of general buying activity in the fall would bring a heavy volume of orders upon primary sources with a consequent largely increased volume of rail shipments. These indications have sufficient basis to render it highly probable that while bad order cars will tend to increase in number at least for a month or two, there will be a concurrent increase in demand for available freight cars for coal, grain and general shipments. Coal alone in the volume mentioned above, if added to present loadings, would bring the figure well above 950,000 a week. When freight car loadings approach the million mark, congestion is almost a certainty."

Toward the end of August the million mark was gradually being approached. Loadings during the week ending August 12 were 852,580 cars, an increase of 1,229 cars over the record of the preceding week. Coal loadings were 84,559 cars, an increase of 5,313 over the previous week. The mines had not yet started work at anything like full tilt, a condition which showed itself in the fact that the 1922 coal loadings for this week were 72,332 cars less than those of 1921 and

137,285 less than those of 1920. The loadings of grain and grain products were 57,567 cars, a decrease of 945 cars under the week before, a decrease of 3759 cars compared with the same week of 1921, and an increase of 18,859 cars over 1920.

These figures, by themselves, provide little basis for a judgment of what is to be expected. But they must be taken in connection with the facts that (1) the coal mines must soon start heavy shipments, (2) the crops are unusually heavy, and (3) reports from manufacturers indicate that industry is getting ready to turn out a lot of goods this fall. If car loadings amount to 852,580 a week before these movements are under way, what will they amount to when things get going?



Shortage, surplus, bad-order, and total loadings of freight cars.—*(U. S. Bureau of Census.)*

No one knows yet what condition the railroad equipment will be in. The longer the shop strike lasts, the worse the equipment will undoubtedly get. Yet the railroads stoutly declare that their cars and locomotives are in good shape, and that they will have lots of rolling stock when it is needed. L. F. Loree, president of the Delaware & Hudson and the leader of the railway executives in their strike battle, has issued a detailed statement in support of this contention. He quotes a report of the American Railway Association to the effect that there was a surplus of 85,671 box cars in serviceable condition on August 1, and adds:

"A survey of the entire country shows this equipment to be where it was needed—51.1% of the box cars were on the owning roads; in the Western territory the number was 55.6%.

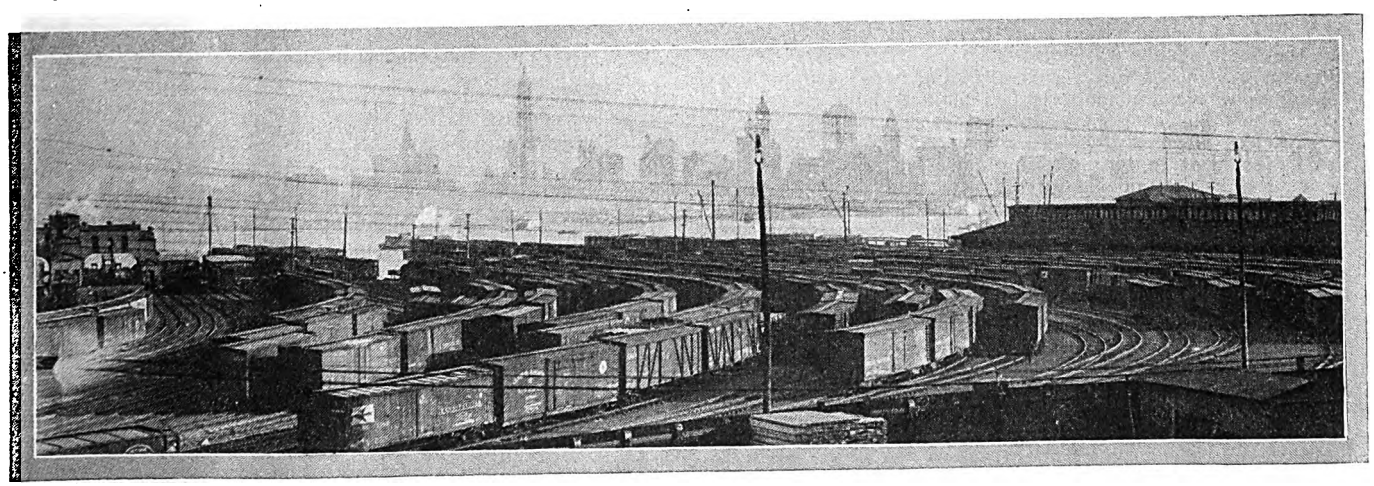
"The initial grain movement being largely to interior markets and mills, this condition remains practically unchanged today. The number of cars available for loading is substantially in excess of those in 1917, the year preceding Federal control. The movement is being handled with great care, the percentage of empty to total car mileage being as low as 29.2. There are no grounds for apprehension as to a full supply of cars for the grain movement this year.

"The normal daily loading of coal in August, 1921, was 23,688 coal cars. At the present time there are being loaded 13,637 coal cars daily. Were the normal production of last year to be restored overnight, 10,051 additional cars would have to be furnished daily, and as these would be in service 15 days in the round trip to destination and return to the mines, it would involve the use within two weeks and thereafter constantly of 150,000 additional coal cars.

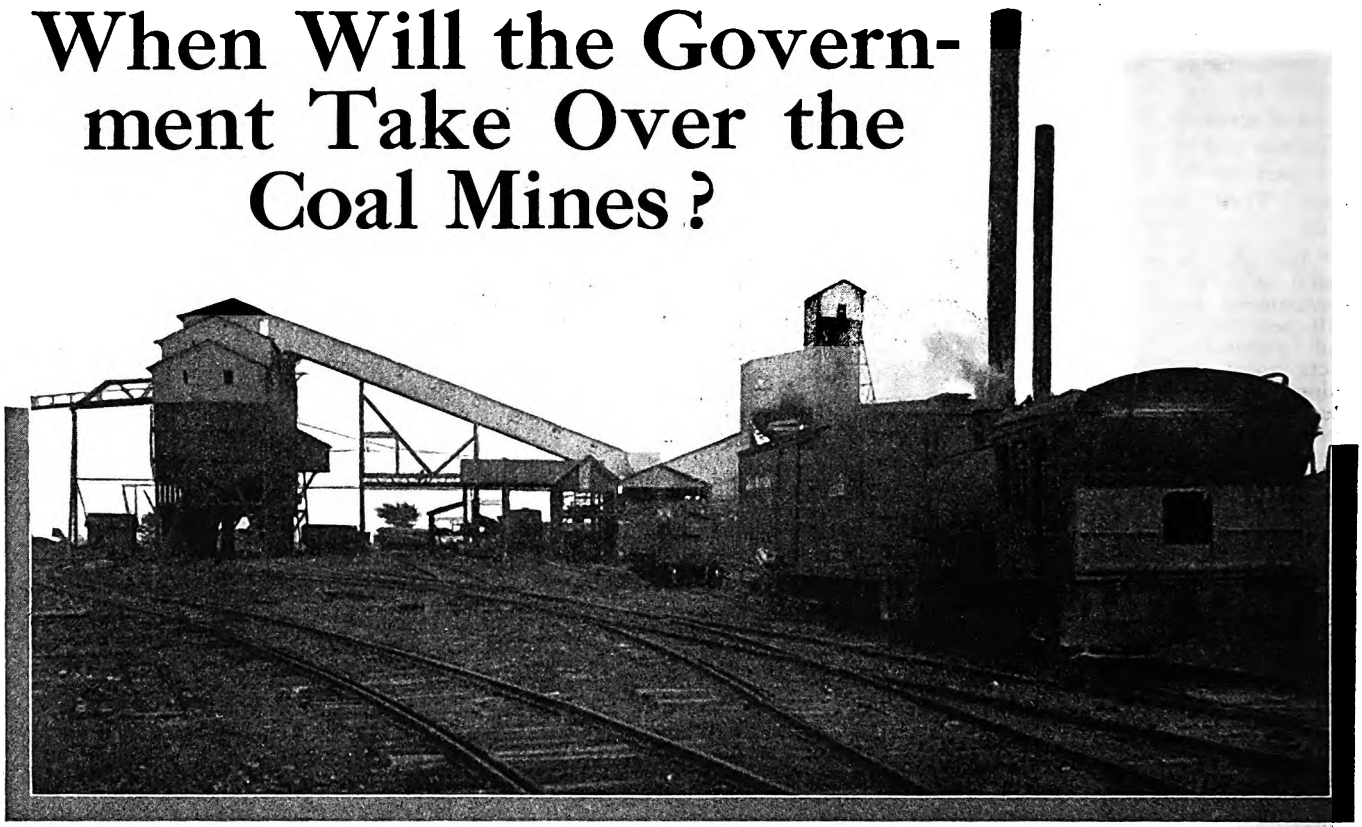
"There were stored because of the coal strike and standing idle 112,000 coal cars on August 1 in serviceable condition, and there were reported as on hand and requiring light repairs (that is, repairs requiring less than 20 man hours) 29,795 coal cars. These could be at once put in service. This would leave about 8,000 coal cars to be found, and these would either have to be supplied by a quickened movement or by the repair and return to service of that number from the 116,748 coal cars requiring heavy repairs, on which more than 30 man hours' work need to be done, and as there would be two weeks' time for this work, there is no doubt of its accomplishment.

"It will, on the one hand, be evident that later in the season the output of coal will be increased; on the other hand, the condition of the shop work is being rapidly improved.

"There were in the whole country on July 1, 64,341 locomotives, of which there were stored in serviceable condition 6,332, laid up for repairs requiring less than 24 hours' work 3,094, and requiring more than 24 hours' work 11,318, so that there were in actual use 50,003. Of the total 17.6% required over 24 hours' work on repairs, while the average condition for the first six months had shown 19.9% as requiring over 24 hours' repair. No figures for the whole country are available later than July 15, when the total of bad orders stood 19%.



When Will the Government Take Over the Coal Mines?



ANYONE who had clung to the idea that the Government of the United States could be of any appreciable service to industry in a pinch must have been disillusioned when he watched the efforts of the Government to do something about the coal and railway strikes. President Harding tried to settle the shop strike, and was rebuffed by the roads and the unions in turn. He gave a great deal of attention to the coal mine tie-up, and it was constantly announced that he was on the point of accomplishing something; but the strike went quietly on until a group of operators and union leaders got together and made terms all by themselves. The *New York Times* points out:

"A notable thing in the settlement of the strikes is the fact that the result was reached by direct negotiation of the parties concerned, and not by Government intervention. It is true that the Washington Administration repeatedly sought to make use of its good offices. In attempting this, the President was acting on a general public demand and was undoubtedly doing what he conceived to be his official duty. But the result was only a succession of rebuffs. When it was not the operators who rejected his proposals, it was the miners; whenever the striking railway men seemed to be ready to accept the solution offered by him, the railway executives declined it, and vice versa. It may be said that it was not the fault of the Government, but the difficulty of the situation, which led to all this appearance of futility. But the consequences are none the less plain and have a significance which few can fail to appreciate.

"President Harding long ago announced his desire to have less Government in business and more business in Government. But he was unable to prevent appeals being made to him in what was felt to be a national crisis, and he responded to those appeals to the best of his ability. Yet the final settlement came very much as if the Government had taken no part in the affair at all. No doubt it is true that some of the positions laid down by the Administration, whether in private interviews or in public utterances, had their effect on the public mind, and very likely an indirect influence upon those who at last settled the controversy; but the real work was done by individuals—representing, to be sure, labor organizations and associations of owners—with the Government rather conspicuously left out of it. The whole is a striking proof of the place which still remains in our great industrial and labor problems for private initiative."

And *The Freeman,* looking at the matter from a different point of view, says that the strikes have resulted in "the utter rout of the Government."

"Government at once made its invariable pompous move with troops and Federal marshals, and has had its bluff handsomely called by the trainmen, who simply quit work anl left the troops and the stalled trains to look at one another," says this paper. "Meanwhile poor Mr. Harding was swiftly smitten on one cheek by the operators and on the other by the strikers; and the two contending forces have ushered the Government out on the side lines and warned it not to trespass on the gridiron while the game is on. The Government can do nothing but obey, because there is a big vote at stake; and there you are! We think that this spectacle ought to be quite affecting to those who still retain a confiding interest in politics and political government. They tolerate a bureaucracy which has grown so enormously that one parasite now rides on the backs of every two producers —and this is what its actual authority amounts to!

"It is all very well to complain of Mr. Harding, or to poke fun at him, for the ineptitude of his efforts to settle the strikes; but, if one side or the other or both sides prefer to fight it out, what can he do? There is no place that we can see in a controversy of this kind where he can effectively break in. The most that he could do is to take over the properties for operation by the Government, and he is well aware that a threat of this would be idle."

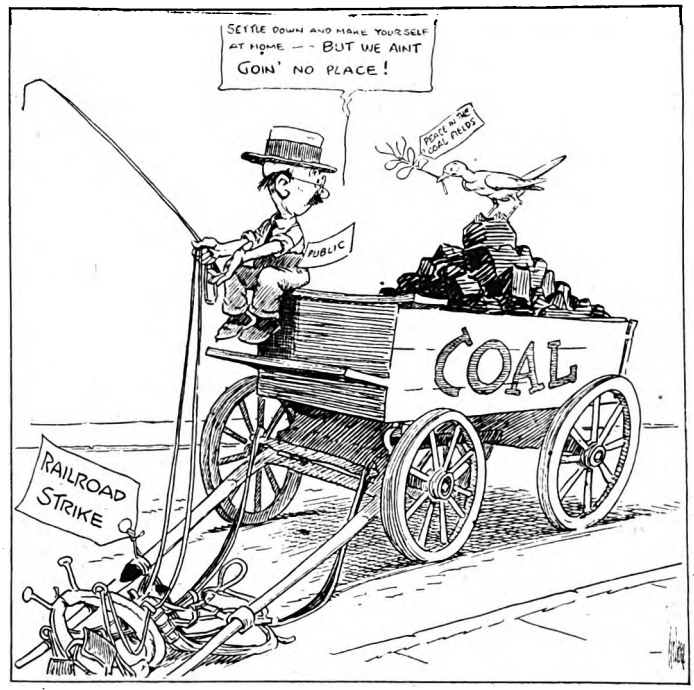
Mr. Harding has not been content to take the back seat that was offered to him. The industrial situation patently has been bothering him a great deal, and in a special message to Congress he set forth this trouble. He told at length the story of his unsuccessful attempts to handle the situation, and he asked for Congressional support. But the only specific recommendations he could find it in his heart to make called for (1) a commission to investigate the coal industry; (2) a law for the protection of aliens whose rights are threatened by industrial disputes, and (3) the strengthening of the transportation act.

Of these recommendations the one requesting a coal commission is the only one with much weight, and that calls merely for another government investigation. Most persons seem to agree that trouble in the coal fields cannot be stopped until the industry is reorganized in some way, and the first step toward a reorganization seems to be an attempt to get

the facts. Therefore, this recommendation was followed by an attempt at prompt action on the part of Congress and by approval on the part of the press. The New York *Evening Post* says:

"Any plan worthy of the name will call for constant Government fact finding; it will ask for the collection and publication of all the facts about coal production, shipments, storages, costs (including costs of distribution), and prices. Such information can be made as helpful to the industry as the facts which the Government steadily collects about crop acreages, crop yields, costs, and prices are to the farmer, while it will be indispensable to the consumer. It will constitute an attack upon ignorance as a pillar of the existing maladjustment.

"The coal commission the President will appoint has an opportunity to do a work commanding the gratitude of generations. It will be able only to recommend steps to the miners, the operators, and the Government, but if the Government acts vigorously, public opinion—now so thoroughly exasperated with the industry—can force the other two parties to follow its lead."



(Columbus Dispatch)

The dove appears at the wrong end of the situation.

During the discussion which would be created by a Government investigation a real plan for the reform of the coal industry might be suggested. It is worthwhile here to mention a plan suggested to THE INDUSTRIAL DIGEST by E. C. Cook, president and managing editor of the *Railway Journal*. Mr. Cook writes to the editor:

"If every large coal consumer and every organization of firms that are large coal and coke consumers, would secure their own coal lands and produce their own coal, they would leave the coal market in the hands of small consumers who would thus have a better chance of fair treatment.

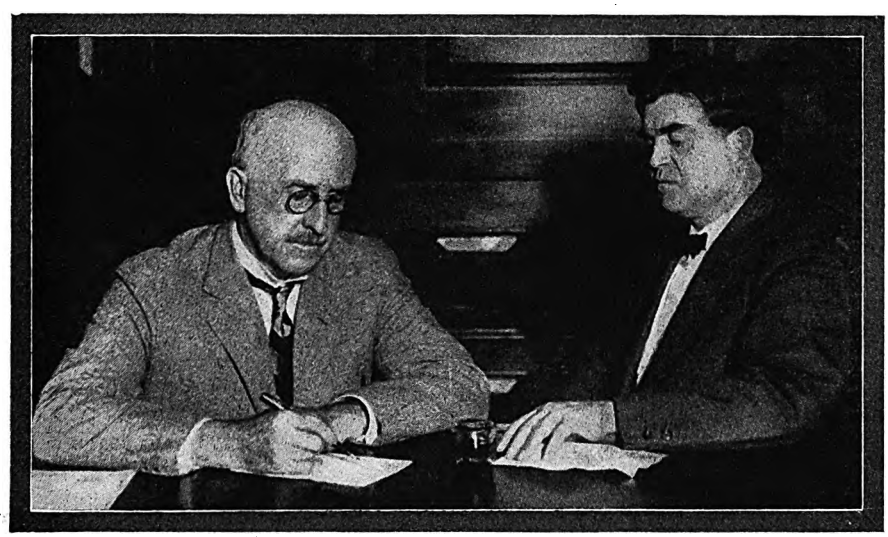
"We know that all the coal lands have not yet gotten into the hands of speculators, though these lands are being purchased as fast as big moneyed men can secure them. It was only a few days ago that we heard from an official on a railway in West Virginia, who referred to some considerable acreage of fine coal lands along their road they would like to see developed to produce more traffic over their system from that section.

"A railway executive in the New England States wrote us recently that the time is not far distant when that section would produce its own coal supply from mines owned by the states themselves. This is no socialistic idea; it is one that means real economy for the consumer. Why should not cities and states own their source of fuel supply and provide fuel for their institutions, and even for individual consumers if they have an oversupply each year? If it pays the big steel firms, packing houses and other industrial lines to produce their own coal and coke, why should it not pay cities, states and communities as well as manufacturing associations?

"The present law does not allow the railways to own the lands from which they secure their coals; that is railways cannot mine their fuels any more. This is wrong. They should be allowed to operate mines to produce fuel for their own operation. The railways consume 26 per cent of the coal consumed in this country. If they produced their own supplies, there would be that many purchasers off the market, hence the public would have a better chance at a fairer price. All big coal consumers should mine their own fuel as a matter of financial as well as fuel economy."

Bills providing for a coal commission were promptly introduced in both branches of Congress, and the House quickly passed one and sent it to the Senate. That body, with the tariff bill temporarily out of its way, seized upon the industrial situation as an opportunity to talk excitedly. A number of measures intended to remedy the situation were introduced and vociferously debated.

During the discussion which would be created by a Government investigation a real plan for the reform of the coal this would not be sufficient, and with the cooperation of Mr. Hoover prepared a bill providing for The Federal Fuel Distribution Commission, to find out whether fuel is being distributed properly and at fair prices and to make rules to govern its distribution. Senator Walsh thought both of these measures would be insufficient and introduced a resolution authorizing the President to take over the mines and operate them. Senator Edge went everybody else one better by introducing a bill giving the President permission to buy all the mines in the country if necessary, and appropriating "the moneys necessary to make just compensation for private property taken."



The end of the bituminous coal strike in the Central States. T. K. Maher for the operators and John L. Lewis for the miners signing the peace treaty. *(©Galloway.)*

Meanwhile the actual improvement in the strike situation is not great. Production in the reopened bituminous mines in the central field was small at first, and grew only gradually. Much to the disappointment of the public, and to the discredit of the United Mine Workers, the attempt to settle the anthracite strike failed. This failure

(Turn to p. 1520)

Congress Passes the Buck

But delays passage of bills—"elections are coming"



The Senate office building where many important bills are prepared.

BUSINESS men today ought to be patting their chests and saying:

"See how important we are? Congress and the Administration have spent almost all their time this year attending to *our* problems. Nearly every important legislative measure that has been considered (except appropriation bills and similar routine) has had something to do with industry. Isn't it grand to be well thought of by the Government?"

One reason, perhaps, for the failure of business men to boast in these words is the fact that the attention which Congress devoted to them has not resulted in much action. It is not overwhelmingly flattering to have your affairs discussed at great length by a legislative body which does very little in addition to discussing them. Then, again, the discussion was not entirely of an encouraging nature. Occasionally—during the debates upon the bonus bill, for instance—the talk was such as to make business men weep in despair rather than crow with pride.

A month or so of the Congressional session still remains, and matters of interest to industry will continue to be discussed. In addition to the tariff and President Harding's program for the relief of industrial warfare (both of which are treated in the foregoing pages of this magazine), the measure which will get most of our legislators' attention is the bonus bill. Industry is intensely interested in this, because, if the bill is passed, another obstruction will be placed on the rails ahead of the Prosperity Special—as if the coal shortage and the railroad congestion were not obstructions enough.

The dangers embodied in the bonus bill now before the Senate are outlined in a letter sent by Julius H. Barnes, president of the Chamber of Commerce of the United States, to business organizations in every State. Mr. Barnes said:

"The Senate bonus bill neither authorizes an appropriation, provides any method for raising the revenue, nor perfects any means for sinking funds to meet the eventual liability. Recognizing the danger to government finances in a cash disbursement, it authorizes banks to advance loans on government certificates, the results of which will be to sequester cash in three-year frozen credits which in the aggregate will amount to hundreds of millions of dollars. *Inflation of currency and credit must inevitably follow.* The bill contains land settlement provisions which are worthless in their application. As a basis for computing a bonus, the Senate Finance Committee took a civilian wage compensation that as a whole never existed during the period of the war.

"Although the national debt increased over 2200% as a result of the war, the Senate Finance Committee proposes at this time to add a maximum of $4,486,000,000 to the financial burden of the government.

"Despite the fact that our estimated deficit for the current fiscal year will approach $500,000,000, the bonus will add, according to reliable estimates, $77,000,000 in the year 1923; and $92,000,000 will be added to our annual expenses of government in 1924, over $73,000,000 in 1925, and $370,000,000 in 1926.

"It is proposed to load this new financial burden upon the government largely through certificates which will mature in 1942. In 1938 the Fourth Liberty Loan of approximately $6,300,000,000 matures. In 1942 the Second Liberty Loan of $3,300,000,000 is due. By 1947 the First Liberty Loan of about $2,000,000,000 must be taken up.

"This country, at a time when it is beginning to respond to a rigid application of commercial and governmental economies and show signs of recovery from what has been one of the most intense financial shocks in the history of the world, will, under the bonus proposal of the Senate Finance Committee, be again subjected to a financial burden, which must necessarily continue, if not enlarge, a system of national taxation which has been largely responsible for retarding the nation in its endeavors to regain its commercial supremacy.

"The nation has already voted a $270,000,000 cash bonus to veterans, so the present proposal is for a second bonus, and for the veterans who live in the fifteen States which have voted $223,000.000 in bonuses, the present bill, if it passes, will constitute a third cash bonus."

The Legislative Program

DURING most of the remainder of the session the bonus bill, like the tariff, will be considered by a conference committee consisting of representatives of the House and the Senate, whose duty will be to reconcile the bills passed by the two chambers. After this committee reports will come the real test of the strength of the bill's advocates. Will the President veto it? If he does, can Congress pass it over his head? These questions cannot be answered in advance. The fact that they are not yet settled makes it important that business men give

their attention to this matter now and use whatever influence they may wield to decide the questions in the right way.

Another measure of interest to industry with which Congress has been ineffectively fussing is the ship subsidy bill. Business men, although they are not unanimously in favor of the subsidy, would rather see this bill passed than the bonus. Nevertheless (or perhaps *therefore*) the Congressional leaders have decided to settle the bonus matter and put the ship subsidy off. But the subsidy is not yet dead. It is one of President Harding's pet measures, and it is said that he intends, if possible, to upset the present legislative program, which calls for ditching his favorite. If he cannot accomplish this, it is said that he will call a special session immediately after the November elections to consider the merchant marine problem.

The ship subsidy bill is important to industry for two main reasons: First, because it is an attempt to provide for our export and import trade adequate home-owned shipping, which will not be upset in case of a European squabble in which we are not involved; and second, because it involves the expenditure of a great deal of money, much of which industry will have to pay. The National Merchant Marine Association points out that we are now paying an ineffectual subsidy of $50,000,000 a year to our merchant marine, and adds that if the bill is passed we will save most of this money and greatly increase the effectiveness of the remainder.

If Congress does not pass the bill, the association says, the following things will happen:

"1. The American farmers and other taxpayers will continue indefinitely to pay the existing annual subsidy of $50,000,000 required for the ships in the Government's hands.

"2. The Government will be obliged to continue indefinitely in the shipping business, because, without aid to the merchant marine, no one can buy the Government's ships and run them under American standards at a profit in competition with the vessels of other nations.

"3. Therefore, the ships acquired by the Government at a cost of billions would continue to deteriorate until they were junk, and the cost of junking them would run into millions of dollars.

"4. With this trade fleet scrapped, there would be left nothing even remotely resembling an adequate merchant marine under the American flag. There would be no reserves of merchant vessels for the Navy to draw upon for supply ships, no tonnage for the transport of troops and equipment. Recurrence of war would find us again unprepared and inadequately protected.

"5. Without shipping facilities of our own, control of the overseas transportation of American products would be in the hands of our foreign competitors. And there would be no restraint of competition to prevent our commercial rivals fixing the ocean freights at such high levels that our grain and other produce would be unable to compete in foreign markets with our competitors' goods.

"6. And, furthermore, there would be no assurance of adequate shipping services if foreigners held a monopoly of ocean transportation. American products would be deprived of ready access to world markets and the demand for our goods abroad would be killed.

"7. Inevitably, there would follow a shrinkage in our foreign commerce. And, without markets for our wheat and other commodities abroad, the surplus of American production over home consumption would be increased to a point that would materially reduce the price the farmer would receive for his output. And always there would be present the menace of a recurrence of the conditions at the outbreak of the World War, when the produce of our farms rotted on the wharves for lack of American ships to carry it to the buyers abroad."

But if the bill is passed, the Association says:

"1. In place of the present subsidy of $50,000,000 per year to keep the Government in the shipping business, there would be a direct subsidy of not over $15,000,000 the first year, increasing in subsequent years to about $30,000,000. Even at the higher figure, this would represent a saving of $20,000,000 a year on the taxpayers' present burden.

"2. This new and smaller subsidy would enable American vessels to compete with foreign ships, and would thereby create

(*Turn to page 1521*)



(New Orleans Times-Picayune)

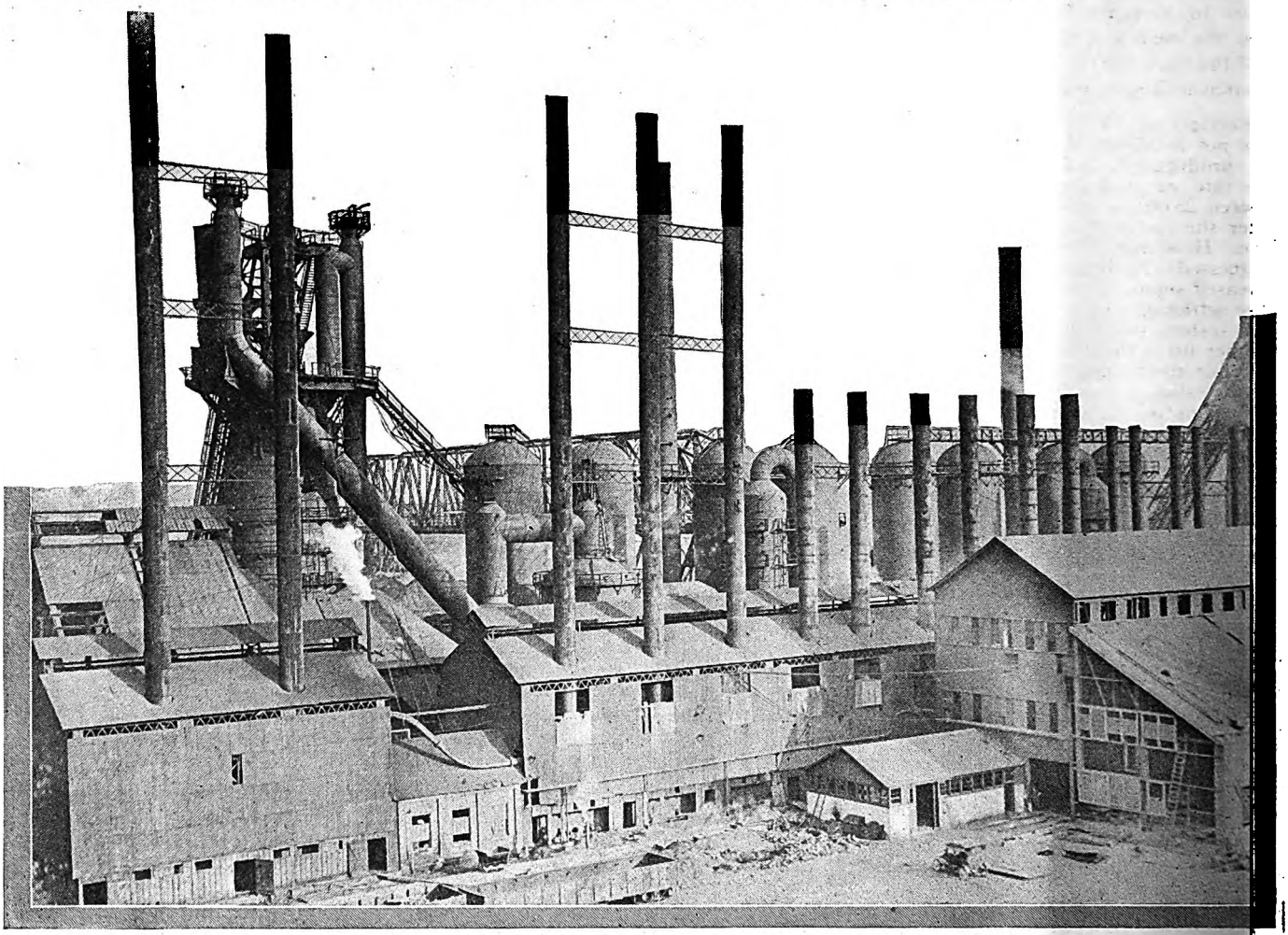
An unusual way of making a living.



(Kansas City Times)

Something more important than fences.

Do the Steel Mill Wage Advances Mark a New Period of Inflation?



Cleveland rears her stacks to the skies in evidence of her development into one of our first-rank industrial centres.

SIGNIFICANT things have been happening in the steel trade during the past few months. First, the demand for steel rose faster than anyone had expected and started the steel works humming while most other industries were still comparatively slack. Later the production of steel was cut down by the railroad strike and the coal shortage. Prices began to rise and the rationing of steel was begun.

Then, as a sensational climax, the United States Steel Corporation and the large independents announced wage increases. The Steel Corporation started the ball rolling by boosting the pay of its day laborers 20%, adding the statement that "other rates will be equitably adjusted."

These wage increases mean price increases. Unless the steel companies expected to boost prices, or at least to maintain the advances made since the beginning of the coal shortage, they would hardly be willing to advance wages. Since steel, in some form, enters into the manufacture and transportation of all other commodities, this action by the steel companies is favorable to a general rise of commodity prices.

Furthermore, the steel wage increases probably mean that the trend of wages in all industry has definitely changed. In other words, no more wage cuts may be expected now. Any immediate movement of wages is more likely to be upward.

This assumption is in line with other recent events in the labor field. The coal miners are going back to work without the wage cuts which the operators demanded at the outbreak of the strike. Led by the H. C. Frick Coal and Coke Co., a Steel Corporation subsidiary, a group of non-union coal operators in western Pennsylvania raised the wages of 40,000 men 47%. The National Industrial Conference Board reports more individual wage boosts than cuts in the period between July 15 and August 15. The drop in the total number of wage changes, and the manner in which the number of wage boosts gained on the number of wage cuts, is shown in the Conference Board's record as follows:

Date	Reductions	Increases	Total Changes
April 15—May 15....	54	9	63
May 15-June 15	23	26	49
June 15-July 15	25	21	46
July 15-August 15 ...	7	8	15

In April and early May almost everyone was cutting wages; in June and early July increases and reductions were almost equal in number; in late July and early August the fever to change wage rates had almost subsided; and late in August the United States Steel Corporation set a new fashion by granting a 20% increase. In a few months the trend of wages has passed through an entire semi-cycle.

Steel wage increases, taken by themselves, may be considered accelerators to business, for they are indicative of general wage advances and therefore an improvement in the buying power of the public. The shortage of steel, however, and the increase in steel prices, may have an opposite effect. Industry

cannot make proper progress if it cannot get all the steel it needs, or if it must pay too much for this basic commodity.

Steel production has been dropping since May, largely because it has been difficult for the mills to get enough coal. The Iron and Steel Institute reported that thirty companies, which make seven-eights of all our steel produced 2,711,141 tons of ingots in May, the largest output since October, 1920. In June the output declined to 2,634,477 tons, and in July to 2,487,104 tons. Toward the close of August a Pittsburgh dispatch to *The New York Times* said:

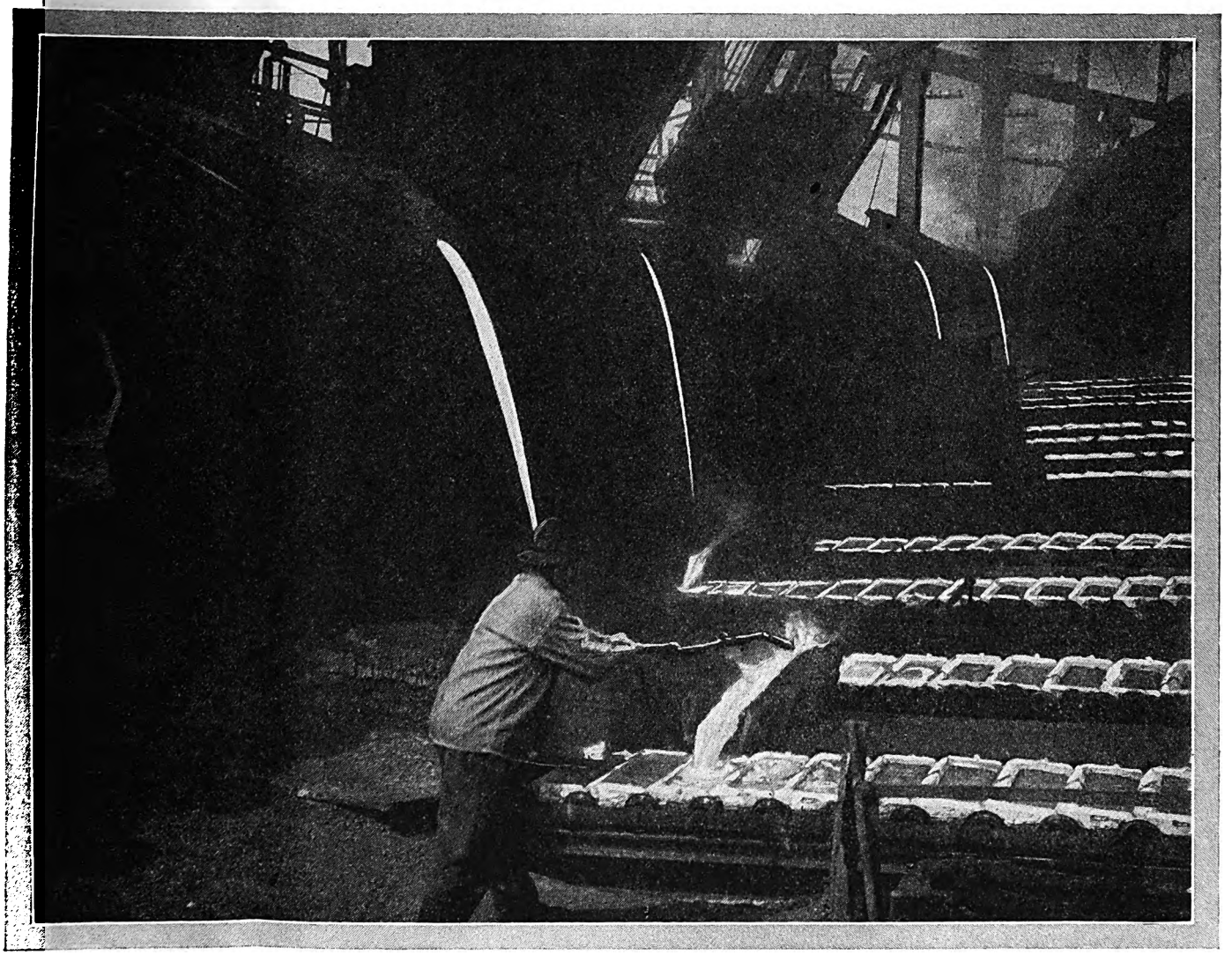
"Receipts of coal by the iron and steel industry as a whole have not increased, and, as *stock piles are playing out one by one*, production of pig iron and steel continues to decrease. The rate of steel ingot production is now about half way between 25,000,000 and 30,000,000 tons a year, or about 25% under the recent maximum rate recorded in the last part of June. How long production will continue to decrease cannot be guessed. Nothing has developed up to date to promise an increased supply of coal for the industry. Recent coal mining wage settlements assure an increased production, but any artificial system of coal distribution followed will give preference to other users than steel producers or steel consumers.

"While the production of steel has decreased about 25%, no definite estimate can be made as to the extent of the reduction in consumption caused by scarcity of coal. It is merely known that there have been decreases in consumption at some points. On account of steel being scarce, consumers having stocks of steel are indisposed to admit it.

"A number of the steel companies have been *rationing their shipments* in an effort to place the steel where it will do the most good, taking care of the more important lines of consumption, while incidentally the rationing will have the favorable influence for the future of preventing steel from accumulating in the hands of buyers and operating to decrease demand later on when it becomes easy to make steel.

"With restricted production, and with moderately heavy sales in the past few weeks, the steel mills are sold much further ahead in point of time than was estimated at the beginning of July. At that time there was a policy among many steel producers of holding prices down, despite the pressure of buyers, so as to provide an attractive market level for autumn buying and avoid the necessity for a price adjustment after the coal strike. Mills are now filled up so far ahead that there is no room left for an autumn buying movement of any proportions, and the next heavy business will have to be for the early months of 1923. As a result of this new alignment producers have become less conservative in the matter of prices, and advances are common, even on steel for late delivery, described as 'delivery at mill convenience.'"

A large number of blast furnaces, estimated at from thirty to forty, in the Chicago, Cleveland, Youngstown, Pittsburgh and Buffalo districts had been forced by the coal shortage to shut down just as the coal strike was being settled. It was indicated at that time that even after the flow of coal from the mines is renewed, the steel shortage will continue because of the transportation tie-up. There probably will be a shortage of cars to carry finished and semi-finished steel products, as well as a lack of sufficient cars to carry coal. One expert has said that it will take the steel mills at least two months to recover from the strike. This seems like an optimistic view. This situation certainly will not help industry to speed up. The building boom especially will feel the retarding effect of a steel shortage.



Pouring molten iron into molds, from which will come the pigs that are made into steel.

Our Neglected Inland Waterways

What has happened to our Mississippi River traffic?

EVEN with the termination of the coal strike, there is still great conjecture and worry about the railroads and the inevitable congestion and tie-up that is sure to ensue. Railroads being practically the only means of freight transportation, the problem, therefore, seems a hard nut to crack. Trucks and other vehicles are expected to be pressed into service, but these can hardly be considered of any great importance.

There is, however, another carrier available—the waterways, and immediately the solution of the seemingly impossible tangle presents itself. It needs but the proper utilization of one of the biggest rivers of the world, the Mississippi, to prevent the certain tie-up of the railroads.

Why has it not been more fully utilized? The silence of the docks today is a sharp contrast to the activities of forty years ago. Then the docks were jammed with all kinds of traffic and the harbor itself was one mass of boats. The river boats carried cotton from New Orleans, beef from St. Louis, and lumber and iron from Chicago, making short but frequent trips up and down the river. Had this traffic increased in proportion to the growth of population instead of being allowed to die out, the volume of business done would today approach a startling figure. But in 1922 little remains to remind one of the bustling days of 1870.

Why have our inland waterways been permitted to fall into this present state of neglect. Patrick Francis Cook, writing in the St. Louis *Globe-Democrat,* says:

"No greater blunder has ever been committed in the history of a nation than that the mightiest means of transportation in the greatest republic of the world should have been permitted to fall into such comparative uselessness as has the Mississippi River during the past twenty-five or thirty years."

There has been a great deal of talk about this subject, but very little has been accomplished, and at one of the many conferences held in St. Louis by the Mississippi Valley Waterways Association the subject of improving the great river was again discussed and set forth in all its various relations by distinguished speakers of the surrounding country. Again, Mr. Cook says:

"No sorrier comment could be made upon our utter blindness to our own best interests in this regard than the fact that, notwithstanding it has been conducting the greatest defense of its national life, France has carried on without interruption during the period of the bloodiest of all wars the construction of a thoroughly modern canal which will give her an outlet to the markets of the world such as she has never before enjoyed. Yet the United States, in a time of perfect peace, permits its greatest waterway to fall into utter neglect, and looks on undisturbed while the forces of reaction and special privilege are doing their worst to make the Mississippi as useless as if nature had never designed it for man's commercial needs."

Since the inauguration of the Mississippi Federal Barge Line, which plies from New Orleans to St. Louis and is now in its fifth season, there has been no development more sustaining to faith than the increasing use being made of the Ohio by the privately owned craft of industrial establishments that find such use decidedly advantageous. From Pittsburgh to Wheeling thousands of tons of bulky steel products, not a little of it in the form of machinery, has been sent this year by barges for delivery at ports along that river and the Mississippi and transshipment to points beyond not having the benefit of contact with the river.

Further, Don B. Haven, sales agent in St. Louis territory for the Bogalusa Paper Company, an auxiliary corporation of the Great Southern Lumber Company, of Bogalusa, La., the largest lumber-producing plant, perhaps, in the entire world, stated that the Bogalusa Paper Company, large manufacturers of container liners, have used the Mississippi Federal Barge Line for shipment of their product into the St. Louis market, recent shipments amounting in the aggregate to several hundred tons. He said:

"We should have used this means of transport for a large portion of the tonnage coming into St. Louis, were it not for the fact that conditions which have obtained in our industries for the past year have made the sale of our product a matter of hand-to-mouth buying and for quickest possible deliveries. Last year the deliveries from New Orleans to St. Louis came through in from fourteen to thirty days' time. With a stable market, completion of new terminals, loading and unloading facilities, our company will in all probability make extended use of the barge line on a scale commensurate with the magnitude of our business. Our paper plant has a monthly productive capacity of 3000 tons of paper, the greater portion of which is marketed in St. Louis and tributary territory."

The old projects for connecting the Great Lakes with the Ohio via some point on Lake Erie, and with the Mississippi via Chicago, have revived discussion. While there is a limit to the water that may be spared from the Great Lakes reservoir, doubtless these projects will be made realities in good time.



Region served by the Mississippi barge service.

Another practical and interesting plan is the one creating a great river trunk system which would include the Mississippi as far as Kansas City. The distinctive feature of the plan contemplates that improvements long ago undertaken, but only languidly pressed in recent years, should be completed, including the wing dam in Ohio and systematic and energetic work for keeping the channel open.

The value of the barge lines during those recurring periods when railroad operation is impaired by strikes or car shortages is borne out by the following paragraph from the St. Louis *Globe-Democrat:*

(*Turn to page 1521*)

Failures As Economic Barometer

The number of bankruptcies follows the variations of the business cycle, and therefore has forecasting value

COMMERCIAL failures have for many years been recorded and tabulated, but observers seem to have overlooked their barometric significance or forecasting value in the economic cycle. The great fluctuations in the numbers of failures from one year to the next are not unrelated phenomena, according to a writer in *The Annalist* (New York), who has made a study of failures for a number of years and argues that their significance depends on the period of the economic cycle in which the failures are considered.

In other words, business fatalities run a more or less regular and consistent course of increase and decrease, along with such other "barometers" as pig iron production, freight car loadings, money rates and the like, in the general economic cycle. As such, the record of business failures at any particular time is worth studying in order to properly understand the phase of the cycle through which the observer is passing in relation to the phase just passed and the period next to come.

"A panic or crisis is the end of a period of prosperity and the beginning of a period of liquidation," according to Emil Hofsoos, the author. "Such a phenomenon is usually precipitated, or evidenced, by the failure of one or more large and important concerns. As these large failures occur, others, because of the close interdependence of business, rapidly follow in their wake. One failure causes another, and this vicious circle continues until the effect of the original failure and the precipitated crisis has spread itself out over so large a portion of the business structure that its force has ultimately been spent."

In this way, during a period of liquidation, failures are large in number and in liabilities involved. Liquidation gives way to depression, as is seen in Chart No. 1, showing the course of business failures for the "break" in May, 1920, to January, 1921.

The causes for the increasing number of failures during liquidation are not difficult to discern. Immediately after the "break" there is a precipitous drop in prices, and the market for merchandise shrinks seriously. In consequence there are large losses in inventory values, banks withhold credit, old notes fall due and are hard to meet, and the general business psychology is extremely bullish.

All this while the number of failures has been increasing and is of no especial significance, according to the author of the article, except that when the number shows a definite downward trend the beginnings of recovery are at hand. It may be noted that toward the end of a depression the number of failures continues to increase. This is a situation likely to result when creditors, finding that the industrial atmosphere has been somewhat cleared and that their own condition is a little improved, force their debtors more strenuously than they dared to when they were themselves in precarious positions.

This would account for the seemingly abnormal record observable in the latter stages of depression. Evidence of this argument is afforded by Chart No. 2. The conclusion follows, therefore, that not until there is a definite decline in the number of failures can the period of recovery be said to have begun.

The next development is the very gradual continued decline in the number of failures. Witness the present development in the number of failures. Chart No. 3, illustrating by weeks the downward course of failures from the beginning of 1922, shows clearly that business is on the up-grade. A very marked drop in the number of failures does not occur until the period of prosperity is at hand. Purchasers have bought on a rising market, and when demand calls for their goods, a considerable profit is realizable. It doesn't require much astuteness to make money and hold on to the business band-wagon at this stage of the economic procession; consequently there are few failures.

The two chief causes of failures are incompetency and lack of capital, and during a boom period a liberal extension of credit from the banks and rising prices will make up for a lack of ingenuity and acumen. Natural economic laws do not raise much havoc during the boom period.

The fact that failures are comparatively rare in a period of prosperity, so continues the argument, gives them their chief forecasting value. Business is essentially rhythmic in character and development; and there soon follows, as a result of the great over-expansion and its attendant evils, the crash and liquidation which starts the entire economic process all over again.

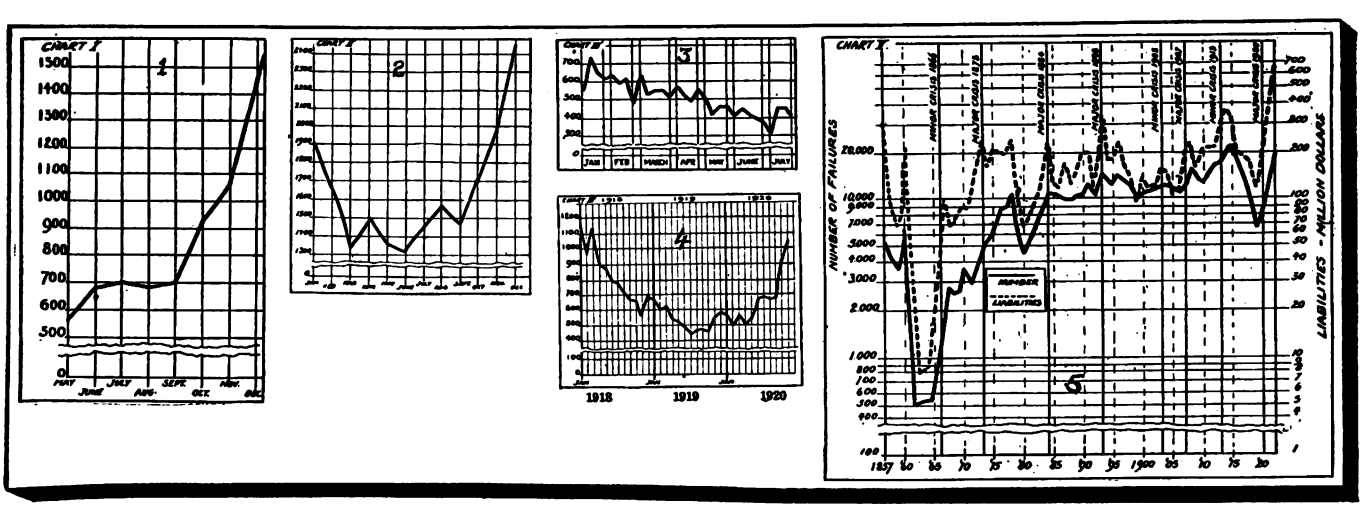


Fig. 1—Commercial failures in 1920, May-December. Fig. 2—Commercial failures during period of depression, January, 1921, to January, 1922. Fig. 3—Commercial failures during period of recovery, January-July, 1922. Fig. 4—Commercial failures, 1918-1919. Fig. 5—Commercial failures in the United States, 1857-1921 (Figures from *Dun's Review.*)

Improvements and Inventions

A Substitute for Cast Iron Pipe

A CHEAP bituminous clay pipe, to be used in the place of cast iron pipe, has been devised by the Carnegie Institute of Technology. The new form of piping, it is expected, will be as satisfactory for drainage and sewerage purposes as the more expensive cast iron pipe which has been the only variety available up to the present.

The chief difficulty in the search for a substitute for cast iron pipe has been to find a method of joining the ends of the substitute piping without leakage. Various bituminous cements were recommended for this purpose, but early experiments showed that they were unable to overcome the difficulty. An entirely new jointing technique in the use of these cements has now been devised. Four important points have been established: (1) the jointing of the pipe can be effectively accomplished by the use of a proper bituminous compound; (2) the joints made in this manner will withstand any pressure that the pipe itself will stand; (3) a pipe line, jointed in this manner, can be thrown out of alignment without causing leakage at the joints; (4) leaks due to poor workmanship can be prepared easily and quickly.

New Use for Chlorine

CAUSTIC soda is made economically by the aid of electricity from solutions of common salt, but each time a pound of caustic soda is made an equivalent amount of chlorine gas is made as well. Unfortunately, the demand for caustic soda has always been greater than that for chlorine. The result is that the industry has been hard put to find a use for the excess chlorine manufactured, for this corrosive, poisonous gas cannot be released into the atmosphere.

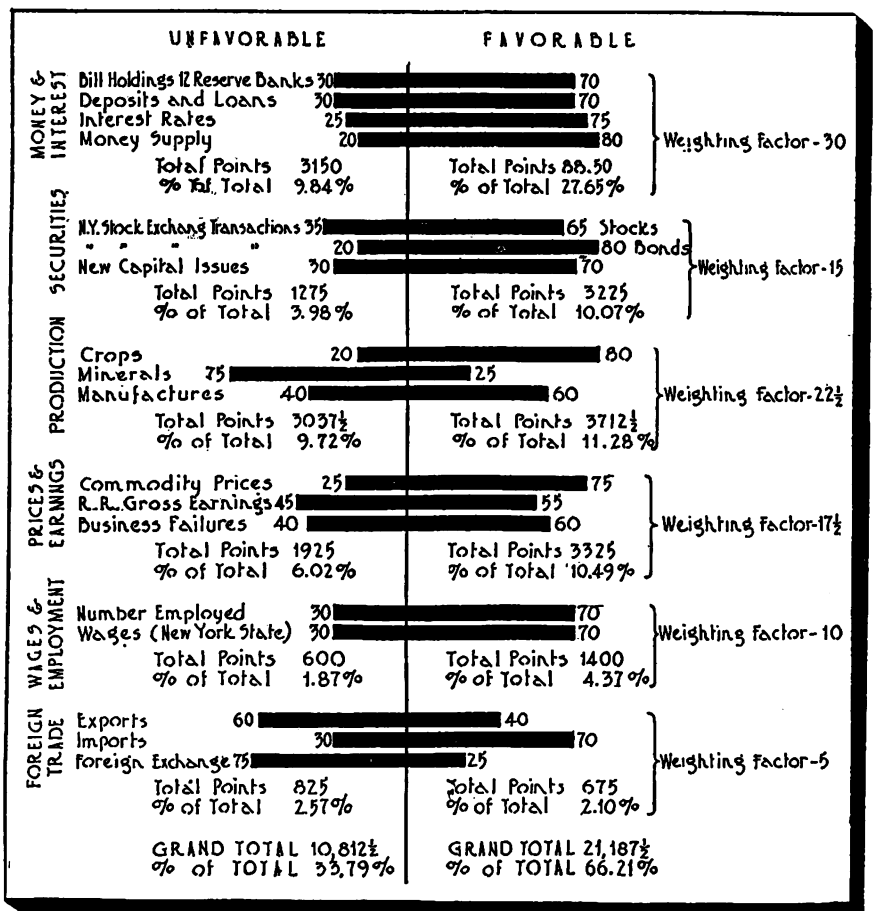
Chlorine may be made into bleaching powder, or used in the form of gas in the purification of water, the bleaching of cotton fabrics and the preparation of cellulose in the manufacture of paper. Italian chemists have discovered a method of using chlorine which will help industry dispose of surplus.

The work leading to this new development was done by an Italian electrochemical company manufacturing caustic soda, which was confronted with the serious problem of getting rid of its excess chlorine. This company, La Elettrochimica Pomilio, of Naples, is now operating the process successfully both from an industrial and technical standpoint. The process is worked on a large scale and produces an excellent pure cellulose from wood, hemp and hemp refuse, straw, esparto grass and other vegetable fibers. The product can be used alone, without the necessity of admixture with rag stock, to make high-grade bond and writing papers. In the course of the process hydrochloric acid is evolved. Experiments are now being made to devise a way to recover this acid.

Gas from Crude Lignite Coal

DURING the past few months, the country under stress of the coal strike, has been calling upon chemists and technologists for a new fuel to compete with coal. Their attention has been called to the large deposits of lignite or brown coal in this country, which have not been touched to any great extent, mainly because there are no easy methods of using it for production of power or generation of gas.

Germany, which has been confronted with a coal problem for many years, has been successful in developing machinery that will handle not only the best grades of brown coal, but also the poorest grades of the fuel, containing considerable incombustible mineral matter and as high as 50% moisture. By means of the Poetter gas producer, made in Germany, the lignite coal, in the condition that it is dug out of the ground, full of sand and water, can be directly converted into gas with simultaneous recovery of tar and other valuable products. The quality of gas is comparable with that made in producer gas works from soft coal or coal briquets. There are several steel plants in the west of Germany that are successfully using the gas producer, whose main characteristic is a rotating star-shaped grate, to solve the problem of lack of soft coal for operating purposes.



Favorable and unfavorable elements in the business situation.—*(Magazine of Wall Street.)*

Bleaching Foods with Sulphurous Acid

SULPHUR dioxide has always been considered effective in bleaching foods, but those manufacturers who use this bleaching agent have had great difficulty in removing all traces of the bleach after its work was done. The Government prescribes that food bleached in this way must contain no trace of sulphur. A process has now been patented which enables the manufacturer to use sulphur fumes for this purpose without encountering any difficulty in their subsequent removal. After the bleaching action is finished, enough hydrogen peroxide is added to remove all traces of sulphur dioxide still left in the food. This process can be applied with good results to the bleaching of cherries, gelatine, fruits, syrups, nuts, potatoes, apples and cereals.



Basic Commodity Prices

(Minimum, at New York, unless otherwise specified)

	Week Ending Aug. 26	Week Ending Aug. 19	Year Ago
Aluminum, pig (ton lots), lb.	.175	.17	.20
Antimony, ordinary, lb.	.06	.0575	.0525
Brick, Hudson R., per M.	21.00	21.00	15.00
Cement, Portland, bbl.	1.70	1.70	2.15
Copper, Electrolytic, lb.	.14	.14	.11625
Cotton, spot, Mid. Upl., lb.	.2225	.227	...
Hides, Chic. Pack., No. 1, lb.	.20	.20	.14
Lead, N. Y., lb.	.059	.059	.044
Petroleum, crude, at well, bbl.	3.00	3.00	2.25
Pig iron, Bessemer, Pgh., ton.	31.76	28.76	21.96
Pine, roofers 6 in., M. ft.	31.00	31.00	26.00
Rubber, Up River, fine, lb.	.19	.19	.175
Silks, Sinshiu, No. 1, lb.	7.10	7.00	5.55
Spelter, N. Y., lb.	.066	.063	.045
Steel Billets, Bess., Pgh., ton.	37.50	35.00	29.00
Tin, N. Y., lb.	.32	.3275	.255
Wool, Dom., ½ blood com., lb.	.50	.50	.29

Wholesale Commodity Prices

Coal—			
Bit., ¾ in., lump, net ton	...	...	...
Anthracite, egg, net ton	...	...	...
Coke, furnace, net ton	12.00	14.00	2.75
Cotton Goods—			
Brown Sheetings, Std. yd.	.13	.13	.10
Standard Prints, yd.	.1025	.1025	.11
Print Cloths, 38½ in., 64x60, yd.	.085	.0825	.0725
Drugs and Chemicals—			
Alcohol, ethyl, form 5, gal.	.32	.31	.36
Alcohol, wood, 95%, gal.	.57	.57	.66
Alum, lump, lb.	.0325	.0325	.035
Bleaching Powder, over 34%, 100 lbs.	1.60	1.60	2.00
Borax, crystal, in bbl., lb.	.06	.055	.055
Caustic Soda, 76%, 100 lbs.	3.65	3.60	3.85
Lime, factory, 200-lb. bbl.	1.90	1.90	...
Nitric Acid, 42°, lb.	.065	.065	.07
Saltpeter, crystal, 100 lbs.	.0775	.0775	.1075
Soda Ash, 58% light, 100 lbs.	1.75	1.75	2.00
Sulphuric Acid, 60%, 100 lbs.	.45	.45	.55
Flour—			
Spring Pat., 196 lbs.	6.25	6.75	7.75
Winter, soft str't, 100 lbs.	4.50	4.90	6.00
Grains—			
Wheat, No. 2 Red, bu.	1.175	1.185	1.34
Corn, No. 2 Yellow, bu.	.8275	.845	.7775
Oats, No. 3 White, bu.	.43	.435	.475
Rye, No. 2, bu.	.82	.8575	1.1175
Barley, malting, bu.	.70	.70	.76
Hay, No. 1, 100 lbs.	1.45	1.45	1.50
Straw, lg., rye, No. 2, 100 lbs.	1.25	.95	1.10
Hides—			
Cows, heavy native, lb.	.1875	.1875	.13
Country, No. 1 steers, lb.	.14	.14	.08
Iron and Steel—			
Basic, Valley furnace, ton.	26.00	25.00	18.00
Steel bars, Pittsburgh, 100 lbs.	2.00	1.90	1.75
Beams, Pittsburgh, 100 lbs.	2.00	1.90	1.80
Galvanized Sheets, No. 28, Pittsburgh, 100 lbs.	4.35	4.15	3.75
Leather—			
Hemlock, sole, No. 1, lb.	.29	.29	.27
Scoured oak backs, No. 1, lb.	.54	.54	.54
Lumber—			
FAS Qtd. Wh. Oak, 4/4", M. ft.	145.00	145.00	135.00
Tonawanda Wh. Pine No. 1 barn 1x4", M. ft.	82.00	82.00	86.00
Adirondack Spruce, 2x4", M. ft.	38.00	38.00	40.00
No. 1 Com. Y. Pine Bds., 1x4", M. ft.	45.00	45.00	37.00
Oils—			
Coconut, spot N. Y., lb.	.085	.085	.10
Crude, tks, f.o.b., coast, lb.	.06875	.06875	.08
China Wood, bbls., spot, lb.	.125	.1225	.15
Cottonseed, lb.	.10	.1125	.0865
Linseed, city, raw, gal.	.92	.93	.80
Paraffine wax, ref., 125 m. p., lb.	.035	.035	.035
Turpentine, gal.	1.21	1.27	.64
Paints—			
White Lead, in oil, lb.	.125	.1250	.1225
White Lead, dry, lb.	.0725	.0725	.065
Zinc., Amer., lb.	.07	.07	.075
Paper			
News roll, 100 lbs.	4.00	3.75	4.75
Book SS. & C., lb.	.075	.075	.067
Wood Pulp, ton.	75.00	75.00	80.00
Sugar—			
Cent. 96°, 100 lbs.	4.88	5.36	4.50
Fine Gran., in bbls., 100 lbs.	6.75	7.00	5.80
Wool—			
Boston Aver. 98 quot., lb.	.7160	.7174	.3988
Stand. Clay Wor., 16-oz., yd.	3.00	3.00	2.85
Fancy Cassimere, 13-oz., yd.	2.45	2.45	2.25
Serge, 36", Wor., yd.	.52	.52	.52
Broadcloth, 54", yd.	2.75	2.75	2.50
Cottonwarp serge, 36", yd.	.45	.45	.45

Financial

Bank Clearings	Week Ending Aug. 26	Week Ending Aug. 19	Year Ago
New York	$3,454,886,246	$3,641,838,814	$2,817,102,402
Chicago	476,001,235	510,569,615	449,674,738
Entire Country	6,494,000,000	6,829,000,000	6,452,000,000
Increase or Decr.	+19.1%	+13.7%	—27.9%

(Per cent of total from preceding year)

Cost of Money—New York	Week End. Aug. 26	Week End. Aug. 19	Year to Date	Year Ago
Call Loans	4½@3¼	4@5	6@2¾	5½@5
Time Loans (60-90 days)	4¼@4	4¼@4	5@3½	6@5¾
Six Months	4½@4	4¼@4	5@3¾	6@5¾
Com. Discount, 4-6mos.	4½@4	4½@4	5@4	5½@6

Financial Transactions	Week Ending Aug. 26	Week Ending Aug. 19	Year Ago
Stock Sales, shares	5,120,869	3,414,043	2,986,999
Aver. Price, 25 Railroads	76.16 h. 68.25 l.	68.88 h. 65.42 l.	52.30 h. 51.06 l.
Aver. Price, 25 Industrials	106.78 h. 104.50 l.	104.54 h. 101.70 l.	69.15 h. 67.13 l.
Sales of Bonds, Par Value	$72,490,200	$63,396,850	$41,844,000
Aver. Price, 40 Bonds	82.54 h. 82.12 l.	81.92 h. 81.30 l.	70.39 h. 70.10 l.
Average Net Yield, 10 High-Grade Bonds	4.415%	4.44%	5.337%
New Security Issues	$133,560,000	$36,809,500	$11,904,100

Business Failures	Week End. Aug. 26	Week End. Aug. 19	Year Ago
Number	348	415	339
	July, 1922	June, 1922	July, 1921
Liabilities	$36,900,000	$38,242,450	$42,774,153
Number	1,743	1,740	1,444

Industrial

	July, 1922	June, 1922	July, 1921
Building Permits	$188,155,537*	$258,674,440†	$135,327,833*

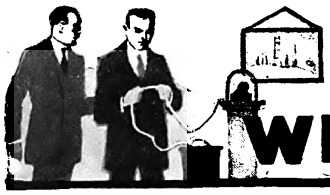
*149 cities. †141 cities.

	June 30, 1922	June 15, 1922	May 31, 1922
Idle Freight Cars			
Number	405,185	442,253	486,846
	Aug. 12, 1922	Aug. 5, 1922	Year Ago
Car Loadings			
Number	852,580	851,351	808,269

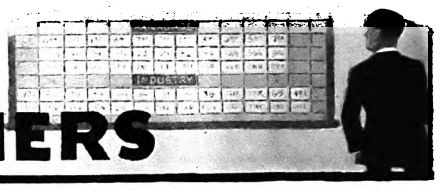
Steel and Iron Barometer	July 31, 1922	June 30, 1922	July 31, 1921
U. S. Steel Orders (tons)	5,776,161	5,635,531	4,830,324
Daily Pig Iron Prod. (tons)	77,421	78,701	27,889
Monthly Pig Iron Prod. (tons)	2,400,045*	2,361,028†	864,555*

*Month of July. †Month of June.

Foreign Trade	July, 1922	June, 1922	July, 1921
Exports	$305,000,000	$334,000,000	$320,708,574
Imports	251,000,000	260,000,000	179,636,711



WITH THE FINANCIERS



Europe Is No Better

THE most interesting financial event of the fortnight was the violent drop in the value of the German mark. The slump was accompanied by panic and confusion in Germany.

This is of interest to us in America chiefly because it is a symptom of the economic confusion into which the world is progressively drifting. Most observers are confident that sooner or later the drifting will stop and the world will resume its proper course, because, as they believe, Germany has great recuperative powers and Europe, although financially upset, is sound from a fundamental economic point of view; but for the present things seem to be going from bad to worse. America, although less closely affected by this than the European countries, is nevertheless involved, because she is a part of the commercial and financial world fabric.

"The depreciation of the mark," says the *New York Tribune*, "has emphasized the dangers inherent in the European situation from the impasse reached in the effort to adjust reparations. It appears altogether probable that the collapse may extend to the point where Germany is equally shorn of ability to buy the things she needs abroad as Austria, leaving out of consideration entirely the payment of her obligations to the Allies. Each week that passes makes it more difficult to check the progress of dry-rot now under way and complicates the restoration of Germany to solvent position. The situation in which Germany is expected shortly to find herself will differ from that of Austria only in that she will possess broader bases upon which to rebuild her economic structure and from that of Russia only in that a similar political catastrophe is not anticipated. The course of foreign exchanges has shown how closely the destinies of Europe, particularly those countries which have ordered their finances with allowance for reparations, are linked with Germany's future."

Speculators Are Wavering

SPECULATIVE operations on the New York Stock Exchange continue to be rather uncertain. For a period in the middle of the fortnight it seemed that the public had come back into the market, and the bull movement has been definitely resumed. Later, however, values began to shift confusingly. The change may have been due to the failure of the negotiations to settle the railroad strike; but it is difficult these days to connect news with stock exchange movements. The market has a way of its own, and pays little attention to things happening on the outside.

Big Bond Issues Coming

THE bond market has been firm but not particularly eventful. The par value of new bonds placed on the market dropped to $7,744,000 in the week ending August 26—a low record for the year. Investors are buying good bonds freely when they can get them; but the bankers have few attractive securities on their shelves. They are looking for good material to supply the fall investment demand.

It is reported in Wall Street that several big issues are being negotiated. One deal is said to involve the refinancing of an automobile company, another a textile concern, and a third the financing of a sugar corporation. These may be expected to develop in the fall. At present corporations needing new capital find themselves able to raise it by means of stock issues instead of bonds. Large stock issues of the American Telephone and Telegraph Co. and the Chesapeake and Ohio Railroad were marketed during the fortnight.

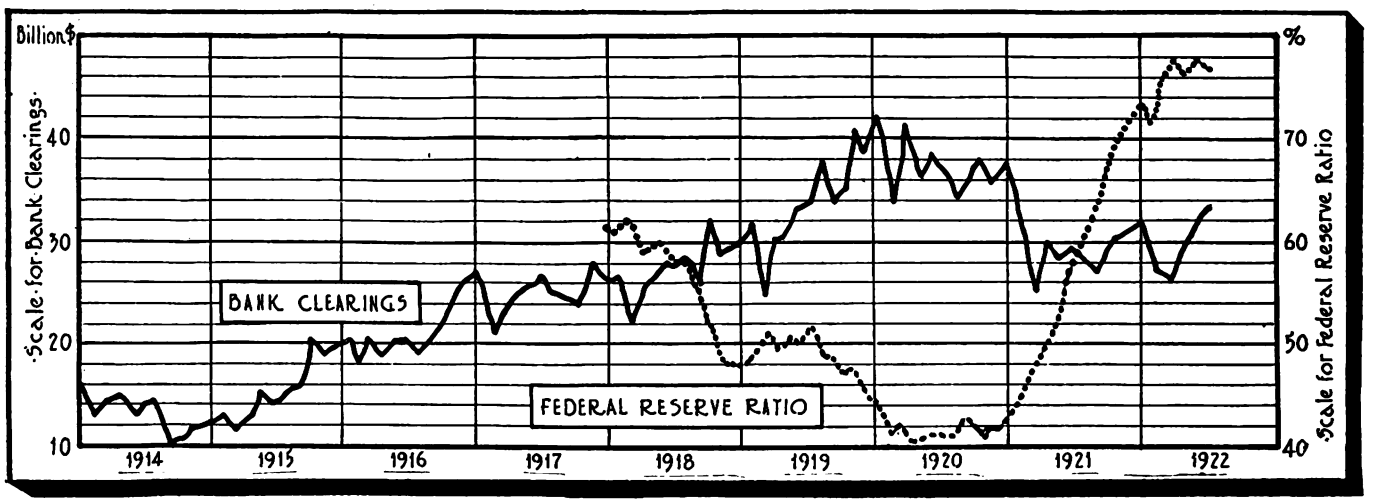
Are Bonds Still Good Buys?

THE soldiers' bonus bill, which is now in the last stages of its passage through Congress, presents the most dangerous threat to bond values that is in sight, according to Burton L. Read in the *New York World*.

"As a minimum effect the Bonus Bill would make heavy inroads on the lending capacity of the banks and would change materially the money market situation that is responsible for present high bond values," Mr. Read writes. "If it forced the hand of the Government on the question of a new long-term issue to be offered to the public, a setback in the values of Liberty Bonds could be looked for, with some corresponding influence on investment issues generally.

"Thus, the strongest potential influence on the adverse side of bond values lies in the direction of Washington.

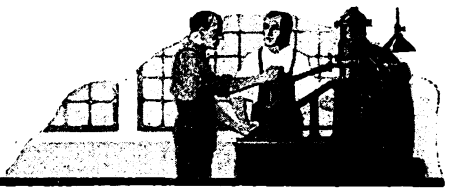
"Apart from possible developments such as indicated there is not much in sight to reverse the upward trend of prices, but two other phases require notice. Both of them are concerned with the outlook for increased business activity, and so contingent, to an extent, on the working out of strike problems. A clear right of way for industrial improvement would call for more money for business uses. It would lessen in such degree the volume coming into investment markets, and would mean a certain amount of selling of bonds, especially of the Liberty group, now held by corporations as a means of keeping funds employed that would otherwise be idle. Further, it would stimulate the offering of new issues by railroad, public utility and industrial companies."



U. S. bank clearings and Federal Reserve ratio since 1914.—*(Magazine of Wall Street.)*



LABOR



Wage Reductions Less Than 5%

IN the opinion of Samuel Gompers, president of the American Federation of Labor, labor has been successful in its resistance to the effort that has been made to cut wartime wages. In an article appearing in the current number of *The American Federationist,* Mr. Gompers says that "the full volume of wage reductions, if spread over the working population and averaged up, would amount to less than 5%. . . . Organization after organization has been able to resist with complete success the efforts of wage reduction and in some cases it has even been possible for the workers to secure some wage increases in the period that has elapsed since the signing of the armistice."

In speaking of the future, Mr. Gompers said:

"Labor Day, 1922, finds the workers confronting the same elemental issues with which they have been forced to contend since the armistice and with which they have been forced to contend in a general way over a still longer period of years. But Labor Day, 1922, finds the worker in a position of greater advantage than before. The crucial period of unemployment has been passed. The wage reduction movement long since lost its principal momentum, and the movement to establish the so-called 'open shop,' which is in reality the non-union shop, has proved without effect. . . .

"Labor has every reason to congratulate itself on the occasion of its Labor Day celebrations this year. These congratulations, however, must be accompanied by determination to continue the struggle, by determination to increase the general intelligence and understanding of the workers everywhere, and determination of the most inflexible character to push with ever-increasing vigor the work of organization, unification and federation."

Continued Improvement in Employment

A SLIGHT improvement in employment has been noticeable during the period between July 15 and August 1, according to the Pennsylvania Department of Labor, in spite of the fact that as a result of the coal shortage several steel and iron plants were forced to close. A total of only 18,450 iron and steel workers was reported as unemployed on August 1, 1922, as compared with 20,050 on July 15 and 25,500 on July 1, 1922. The 11 employment bureaus in the State reported about 92,000 without work on August 1, 1922, as compared with 101,000 on July 15, 1922.

Settlement of Textile Strikes Near

A SETTLEMENT of the various textile strikes in the near future seems probable. The Pacific Mills, in Lawrence, Mass., has announced that beginning October 1, 1922, the mills will reopen with the same wage scale that was in force before the reduction on March 27, 1922. Employees who return immediately will work under a 20% wage reduction until the first of October. It is believed the workers will accept the terms offered. According to *Women's Wear,* retail business interests of Lawrence are urging that the prospective investigation into the New England textile strikes should be made by the United States Department of Commerce under the personal conduct of Secretary Hoover. Merchants are said to be feeling the effect of the strike. Striking broad silk workers who are asking for a 20% wage increase—which would bring their earnings to within 20% of those of 1920—report that four of the mills affected by the strike have made agreements, and 200 out of the 1300 strikers will return.

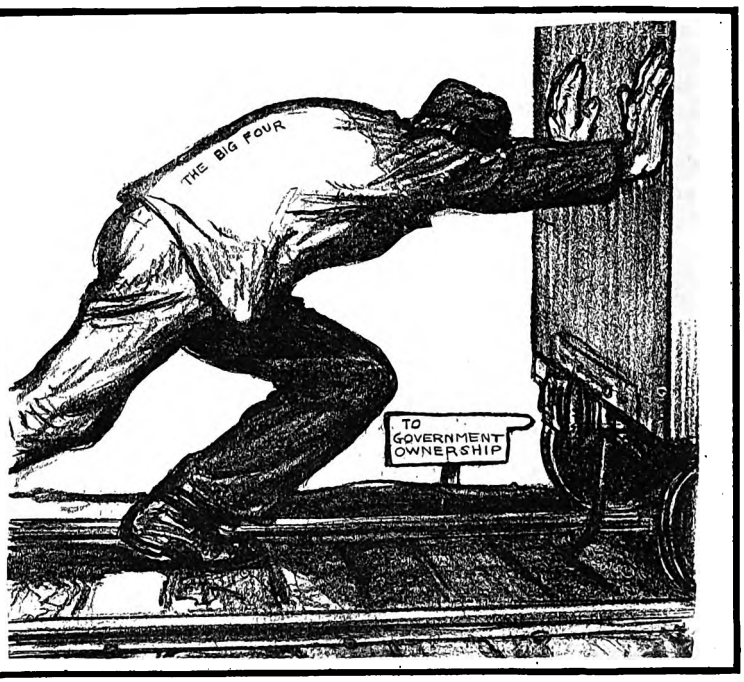
Cost of Living Advances

ACCORDING to the National Industrial Conference Board the cost of living on July 15, 1922, was 55.6% above that of July, 1914. This represents a slight increase during the last month and is due to higher clothing and food prices. Living cost has declined 23.9% from the peak reached in July, 1920, but there has been little change since this spring.



(Newark Evening News)

Using the handiest bluff.

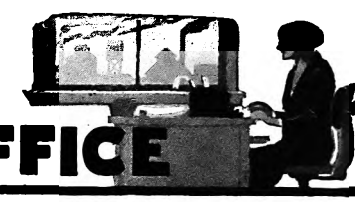


(New York World)

Their main effort.



IN THE MANAGER'S OFFICE



The Value of Graphic Charts in Business

THE effectiveness of graphic charts in the coordination of a large organization is brought out by George A. Galliver in *System*. In the office of the president charts are mounted on a group of boards all swinging around a vertical axis like the leaves of a huge book. The charts include the standard business charts and services and charts of the industry and of the principal raw materials.

Current purchases are paralleled on a chart with the aggregate purchases of competitors as reported by the trade association. If this chart indicates that unwise competition for material is forcing up the price, a profit can be made by waiting until the flurry is over and buying at a lower price. On the other hand, if competitors' purchases threaten to cause a scarcity which would later be embarrassing, orders are placed immediately. Sales charts of the company's own sales and of the estimated sales of competitors are valuable in the same way.

Fluctuations in company finances and their resulting changes in policies are easier to understand when charted. Each important detail of the balance sheet has a chart of its own. For instance, the daily bank balance goes up and down. If the peak goes too high it means money uselessly tied up in deposits which might be used more profitably in the business. The bank balance is constantly compared with the charts of accounts payable and receivable.

The inventory of raw material chart shows both quantity and value. Quantity is important in insuring that there is enough raw material ahead for uninterrupted production. Value shows how money is tied up, costing interest.

What happens to every $1,000 taken in through sales is pictured by a chart. A large square representing the $1,000 is subdivided into vertical rectangles, with the width proportioned to disbursements for labor, material, expense and so on. All these rectangles use up most of the square, and only the last thin rectangle represents profits. Everyone's help is needed to widen this last rectangle; everyone should be shown in some striking form that when dollars of sales are spoken of only cents of profits are involved, and that any saving made in the expense rectangles will be transferred to the rectangle of profits. To direct attention to the most important opportunities for saving, each rectangle is again subdivided into parts.

Shop men unacquainted with finance can be shown by a chart the relatively greater opportunity for profit from a steady volume of business than from a fluctuating volume. This chart analyzes the relation of production volume and production cost. It is compiled from the actual past operating conditions of each unit. It plots horizontally various volumes of production going through the shop at various times, and plots vertically the simultaneous actual hourly cost of production when these various volumes are going through. When large quantities of material are going through the plant, the same equipment and same number of men, or only a slightly greater number, do the work, so the unit cost sinks. When the volume shrinks, the same men must be retained, the same plant is always there, causing almost the same overhead expense, so that the cost of each unit of the smaller volume goes up. The resulting curve of cost begins high at the left of the chart, where the volume is low and slides downward as it goes to the right with the volume increasing.

A separate chart is made for each production unit. Each manufacturing superintendent also realizes by looking at his chart that undue fluctuations in routing production from day to day affects the profits of his unit immediately. As soon as current reports concerning one department have proved their usefulness, copies are routed to the heads of other departments the activities of which depend upon conditions in the first department. The production department wants to know the quantity of stock in the purchasing agent's stores; the purchasing department and sales department want figures on production, and both the purchasing and production departments want to know about orders ahead and sales campaigns.

Weekly production, sales and orders are combined on a summary chart, to picture their intimate connection. Important charts of each month are collected monthly into a "chart book." Each officer or important department head gets a copy.

A Simple Planning System

SCIENTIFIC planning and production control seem to be linked in many minds with vast expenditures of money and intricate systems. E. F. Lindewirth, writing in *100% Management*, describes a simple system based on conferences with foremen. It is particularly applicable to plants which manufacture to stock and assemble to order. All requisitions go to the stock room. The stock clerk furnishes the production manager every morning what is known as a "short list," which indicates the parts required and the quantities. The list is arranged according to priority.

Between eight and eight-thirty in the morning the production manager holds a foremen's meeting in his office and definite assignments for the day are given to each foreman. These assignments are based on the short list, a copy of which is given to each man. This becomes his guide for the daily production of his department.

As this list is revised every day, any variation or discrepancy between schedule and performance is at once detected. Such questions as arise concerning production of the various departments are asked in the open meeting, with the result that foremen are alert in following their assigned schedules. The stock man is present at these meetings to check the statement of any foreman.

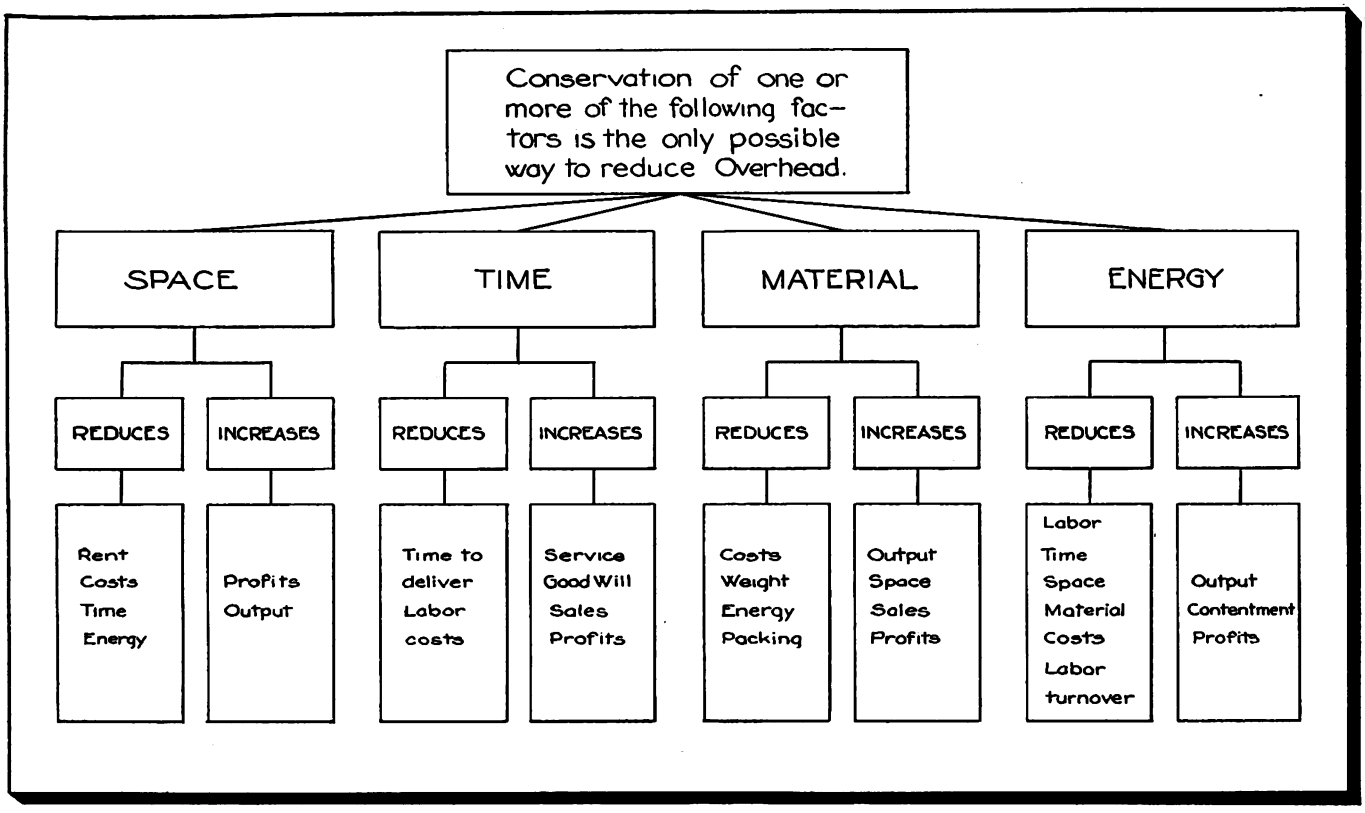
These meetings rarely last more than half an hour, and usually they do not exceed twenty minutes. The results accomplished are that the production manager and the foremen have a bird's-eye view of the day's work and the results of yesterday's work and, in addition, every foreman leaves with a definite idea of what is required of his department that day.

This plan has developed a balanced production. Formerly an assembly order was quite likely to be held up because the depleted stock of perhaps one screw had been exhausted and the fact not noticed. The daily short list remedies this by showing what is required.

"Don'ts" for Purchasing Agents

A COLLECTION of "don'ts" for purchasing agents, compiled from an address by K. H. Taylor to the class in Purchasing at Washington University, is given by *The Purchasing Agent*. While primarily given to future purchasing agents, the suggestions offer food for thought to purchasing agents of long experience.

Don't be a price trader. One of the familiar tricks of the salesman is to learn, if possible, what competitors are quoting



Organization chart showing the benefits derived from reducing overhead.

and then cut these prices slightly. A knowledge that he must stand or fall by the price given will bring out his best proposition at the beginning of the interview.

Don't be a price shopper. Sending out a general alarm on every trifling lot of items wastes time and injures the firm's reputation. A new bidder may be a trifle under the market, but it is usually an expedient to get a trial order and should not discredit the prices offered by regular bidders.

Don't misrepresent, verbally or in writing, what you can do in price, quality or other features of purchases. To one who knows goods and markets, exaggerated or untruthful statements are regarded with suspicion, and the reputation of your firm is injured.

Don't evade obligations incurred. Should the market go up the buyer is protected. If it goes down, the seller is entitled to equal protection. Some buyers seem to believe that they are the only ones to be protected. If something more favorable appears from another source, or they can buy more cheaply on the market, they regard it as their privilege to save money by sidestepping a contract. It may save money, but it does so at the expense of reputation, and reputation is a more lasting asset than money.

Never buy anything because it is cheap. The first consideration should always be quality. Then comes the question of price. Fight shy of bargain-lot, below-cost offers. Ninety per cent of cost-price offers are bogus. There is something wrong somewhere.

Making Inactive Accounts Active

INACTIVE accounts are a gold mine that the average business fails to work, says Homer J. Buckley, in *100% Management*. There should be cooperation between credit men, bookkeepers, sales managers and heads of departments in the development of a follow-up system. The inactive accounts should really be a source of concern to every executive of a business.

Seventy-five per cent of the people who quit buying never complain—they just drop out. Only 25% who have a grievance or complaint tell about it. These 25% are really friends—they are giving the firm a chance to make good. The 75% that quit without complaint usually do so on account of poor service, very seldom on account of price. A few of the reasons are: (1) a cold-blooded letter from the collection department; (2) discourtesy on the part of sales people; (3) errors; (4) delayed shipments; (5) promises not kept; (6) refusal to correct mistakes; (7) making an adjustment with a grudge or a sting in it.

If a name goes into the inactive list a letter or a series of letters should go out to that customer. If the matter is handled properly the customer can be retained, because the firm has shown him the spirit of the house and its appreciation of his good-will.

Production Control to Increase Profits

A SYSTEM of production control which reduces costs and increases earnings is outlined in *100% Management* by R. A. Fink. A schedule board is used showing the job on hand, the next job and the job ahead, and the machine at which the job running may be found. Stock is under a perpetual inventory control with high and low limits definitely fixed. This makes stock constantly available and prevents over-stocking or any unbalanced condition.

Production orders originate in the production office and copies are sent to the stock and tool rooms where the necessary preparations are made. A production clerk handles the schedule board. When an operator finishes a job, his next assignment is indicated on the board. He gets his material and tools and goes to work immediately. Foremen devote their entire time to their proper work—supervising and instructing.

Every operation is carefully time-studied, rates are set and a bonus paid on the time saved over the rate. The time saved is divided equally between the company and the men.

Control, incentive and standardization of parts reduce supervision costs, inventory and unit costs on the finished product.



Automotive

EXPORTS of automotive products during June, valued at $15,063,717, registered a gain of 25 per cent over the exports during May, valued at $11,967,614 (automobile engines included for both months). June exports of automotive products amount approximately to three times the shipments during the first month of the current year, the total having been $5,058,409 for the month of January (not including engines).

In contrast to May, when the increase over April was due to shipments of trucks, the June increase occurred in passenger-car exports, 7,818 having been exported at a value of $5,807,226—an increase of 15% in number and 17% in value—whereas exports of trucks decreased 6.9% in number and 3.2% in value from the May shipments, 1,121 having been shipped during June at a value of $786,279. Automobile engine exports, numbering 8,852 and valued at $831,401, increased 58% in number and 34% in value. Parts exported to the value of $4,089,772 increased 29%, as compared with May.

A careful study of the exports of the recent months indicates that foreign business in automotive vehicles is likely to increase steadily. It is pointed out that price changes in the last year have shown a downward trend for low-cost vehicles, but at no time has the total value of exports of American cars and chassis been as low as the low figure of last year; that is, $2,187,000 recorded in July, 1921. It is reported that a market exists in China which is capable of absorbing 1,000 cars a day, with a potential market for 10,000,000 cars, when the contemplated highway system is in operation.

Cereals

PREVIOUS to 1914, the principal wheat exporting countries, in the order of their importance, were Russia, United States, Argentina, Canada, Austria-Hungary, Australia, and India. Since the war, the principal wheat exporting countries have been the United States, which during 1921 exported 303,000,000 bushels; Canada, Australia, and Argentina.

According to recent reports, the United States should have 220,000,000 bushels for export this year, Canada 200,000,000 bushels and Australia and the Argentine 200,000,000 bushels. It is estimated that Europe as a whole will be 100,000,000 bushels behind last year in crop production. According to this estimate, it appears there will be a demand equal at least to the supply of wheat.

Drugs and Chemicals

THE total export trade in chemicals and allied products was valued at $100,518,943 for the fiscal year of 1922 in comparison with $220,000,000 for 1921. It should not be assumed, however, from these figures that there was a 50% decrease in exports, as there was a marked decline in the value of the products exported during that period. In the more important chemicals there were both marked decreases and important increases in the quantities shipped from the United States.

Among fertilizer materials, exports of ammonium sulfate more than doubled in quantity to 168,077 long tons, valued at $8,720,775, while there was a slight decrease in the shipments of phosphate rock. In contrast were the exports of prepared fertilizers for the first six months of 1922, which amounted to only 9,204 tons, valued at $469,366.

Among the heavy chemicals, exports of acetate of lime and glycerin more than doubled in quantity to 27,606,499 pounds (value $587,174) and 3,625,999 pounds (value $508,807) respectively; caustic soda rose by 20,000,000 pounds to more than 123,000,000 pounds, valued at $46,608,500; borax advanced by 150% to 10,094,724 pounds, valued at $545,601, and silicate of soda and copper sulfate increased slightly to 26,024,366 pounds (value $279,041) and 4,809,948 pounds (value $227,019), respectively. On the other hand, the exportation of bleaching powder decreased by 11,000,000 pounds to 26,439,251 pounds, valued at $502,870, and soda ash showed a decline—from 113,000,000 pounds in 1921 to about 33,000,000 pounds (value $757,648) in 1922.

Exports to Europe for the month of June aggregated $186,000,000 compared with $178,000,000 during June a year ago. Imports totaled $76,000,000 against $55,000,000 in June, 1921.

Electrical

THE recovery of our export trade in electrical supplies and equipment is indicated by the figures for June, which show a heavy increase in the export of electrical goods from the United States, the total ($7,275,552) being almost equal to the shipments for the corresponding month of 1921 and exceeding May exports by nearly $2,000,000.

Power transformers worth $952,494 were shipped during June, which were parts of large equipment contracts now being carried out. Radio apparatus valued at $547,364 and telephone equipment worth $420,820 were other important export items. In general, the increase over earlier months of this year is distributed among all classes of supplies and apparatus.

Lumber

THE total exports of sawn lumber—boards, planks, and scantlings—for the month of June amounted to 152,000,000 feet, as compared with 198,000,000 feet which was the monthly average for the last pre-war year, 1913. It is pointed out that this is a most satisfactory showing. While the total exports of sawn lumber for the fiscal year ended June, 1922, amounted to 1,552,000,000 feet, nearly 300,000,000 feet in excess of the exports for the corresponding period in 1921, the declared value of $52,677,000 was $18,000,000 less, which about represents the general fall in lumber prices.

It is reported that during the last six months there has been a pronounced revival of the export lumber trade of the Gulf ports, according to figures compiled and published monthly by the *Gulf Coast Record* and included in the monthly statistical statement of the Southern Pine Association. June exports were the heaviest since October, 1920, and the six months of 1922 total exports of all lumber were 46% greater than the total exports of all lumber via the Gulf ports for corresponding period of last year. While higher prices for pine are slowing up orders, it is believed foreign buyers will soon become convinced of the stability of prices and will resume buying on the new standard.

According to reports from the Pacific Coast, a marked revival has taken place in lumber shipments to the Orient, cargo space having been booked on all steamers leaving Seattle in early September and October. It is believed that there will be a continuation of good business from Seattle to the Orient for some time to come.



Just as the farmer is rejoicing in a bumper crop—



(Chicago Tribune)

Along comes the gloomy possibility that he cannot market it.

The Farmer and the Rail Strike

Iron and Steel

EXPORTS of steel from the United States in June amounted to only 220,000 tons, which was a decrease of 10,000 tons compared with May. The only large increase in June exports over those of May was steel rails—19,860 tons. There were also a number of small gains, among the more important of which were: Boiler tubes and welded pipe, 2,469 tons; rail fastenings, switches, frogs, etc., 2,367 tons; tinplate and terneplate, 2,068 tons; car wheels and axles, 1,751 tons (an increase of 255%); galvanized sheets, 1,141 tons; barbed wire and woven wire fencing, 1,033 tons. Japan and China retained their positions as the leading buyers of American iron and steel. Japan's purchases in June amounted to 80,806 tons.

Metals

FOR the fiscal year ending June 30, the Copper Export Association reports that approximately $90,000,000 has been realized in the sale of copper to foreign consumers. A large proportion of the copper exported has gone to Germany, more than $30,000,000 worth having been paid for in cash. The chief buyer at present is France.

While the export market for copper is comparatively quiet just now and consumers are reported to be going directly to producers when they wish to purchase the metal, it is believed that sales will steadily increase. *The American Machinist* points out that the recent announcement that the Copper Export Association has just drawn for redemption $3,000,0000 of their 8% gold notes of series "B" and $6,000,000 of their 8% gold notes of series "C," to be paid on August 15, 1922, may be regarded as a favorable omen.

Machinery

EXPORTS of implements from the United States reached their lowest point in December, 1921, when they amounted to $697,435. Since then, however, they have shown a tendency to increase, reaching a figure of $2,382,456 in March. Therefore, the present situation has few discouraging aspects, and there is little likelihood that exports will again reach the low mark of December.

Indications of improvement are found in almost every country which purchases implements, although in most cases it is believed the improvement will not take place immediately, and there will probably be only slight increases in exports of implements from this country during the coming months. On the other hand, there are no strong indications of an appreciable decrease in the demand for American implements and machinery. The ten countries which imported the largest amount of American implements in 1921 are Canada, Argentina, France, United Kingdom, Australia, Mexico, Sweden, British, South Africa, Spain and Cuba.

Exports of agricultural implements and tractors from the United States in June were $217,690 greater in value than the exports for May. Exports of metal-working machinery also took a decided upturn in June. The total value of these exports was $1,446,866, or over a half million dollars greater than those of May, the total exports for that month, amounting to $892,078. The total almost equaled that of the exports in June, 1921, in which month machinery to the total value of $1,488,213 was shipped abroad.

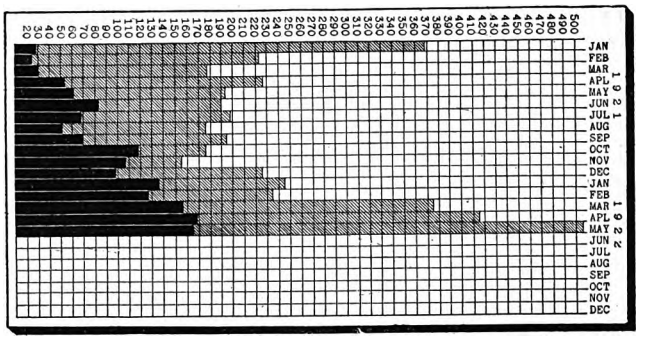
Oils

ALTHOUGH there was a considerable decline in the volume of exports of the chief classes of petroleum products during June, the exports of crude petroleum increased 7% over May and were 39% above those for June, 1921. Canada bought 29,177,576 gallons of the crude oil exported during June and 304,754,307 gallons of the exports for the twelve months. The remainder went chiefly to Germany and Cuba.

Textiles

IT is believed that textile exports, particularly cotton and silk, will steadily increase.

American cotton cloth exports in June continued their upward course of the last seven months, with a total of 62,849,500 square yards, valued at $8,456,500, as compared with 48,395,200 yards and $5,518,000 for June of last year. I tis believed that there is an actual need for goods in many quarters, and it is expected that by September foreign buyers will have less reason to doubt the stability of prices and will trade with greater freedom. While heavy buying is not looked for, a marked improvement in export business is predicted.



Export and imports of cotton hosiery. The shaded bars represent exports, the black bars imports. The figures represent thousand dozens.—*(Underwear & Hosiery Review.)*

Cotton manufactures exported during June to the value of $13,795,637 show an increase compared with $8,643,176, the value of exports in June a year previous. Cotton wearing apparel exported in June was valued at $2,287,297, an increase of over $1,303,855 for the same month in 1921 and $2,074,605 in May preceding.

Manufacturers of silk exported in June increased from $703,704 in May and $651,009 in June a year ago to $1,126,002.



Advertising New Uses

IN advertising a product the importance of telling how to use a product and suggesting additional ways of using it is often overlooked by the new advertiser in his attempt to find an effective copy appeal, says John Allen Murphy in *Printers' Ink Monthly*. It is pointed out that even the old advertiser would be able to re-galvanize his entire campaign if he started to talk about the uncustomary ways in which his goods are used.

Although in the advertising of foods it is well recognized that the logical way to increase consumption is in creating a number of uses, this idea is just as logical in other lines. The following examples are given: "For instance, offhand you would not say that the new use principle is applicable to typewriters. Still it is that very idea the Corona Typewriter has used so successfully. The vacuum bottle would appear to be limited in the scope of its use. Nevertheless, the advertisers in this field by making the bottle in various forms have created several new uses for it. One ingenious use, for example, has been made possible by manufacturing carrying cases for the hiker. The Curtis Companies, Inc., were manufacturers of industrial woodwork and their apparent market seemed to be confined to that field. By modifying the purpose of their business somewhat the companies were able to go to the consumer with a line of houses. In other words they discovered a new use for their old product."

"It Isn't the Size of the Ad That Counts"

THE National Retail Clothier points out that the man whose publicity appropriation is limited has to make his choice between a policy of making a big advertising splurge at more or less infrequent intervals and a policy which keeps his name before the public every day of the week through the medium of a small and unostentatious advertisement. It is not always an easy choice, since there are a good many people who judge the value of the argument by the amount of noise made in presenting it. Constant reiteration, however, is believed to be more effective than an occasional splurge, both in building up good-will and in speeding turnovers of stock.

"Door-Step Markets"

ACCORDING to E. B. Weiss, *Printers' Ink Monthly*, fertile selling fields may often be found in your own community. He points out that "distant pastures look so green that nearby grazing grounds are disregarded. Door-step markets have been passed by with scarcely a thought, while far-flung fields were cultivated intensely. . . . The true cause is that there is a tendency to underestimate the possibilities of the door-step market. Another contributing factor is that the plant locality is frequently used as a 'dog town.' New wrinkles are tried out on the neighborhood folk. New salesmen are allowed to gain experience by calling on home-town prospects. From the immediate return standpoint this use of the local market as a test tube may be economical. It is a sure killer of local sales, though, and since the door-step market may mount to sizable proportions if properly developed, it may not be so economical after all."

Visualizing Sales

AN automobile dealer in Canton, O., employs a very effective method of impressing upon prospective automobile buyers the wide popularity and ownership of the particular make of automobile which he sells.

In one of his display windows, according to the *American Garage and Auto Dealer*, he has a very large map of Canton, and Stark County—Canton being the county seat of Stark County—which is mounted upon an easel and is well-lighted at night with electric lights. At the top of the map appears this notice:

"We have sold —— (number) —— (make of car) in this country since the first of 1922. Watch this number grow.

"Each pin in the map below shows the location of the purchasers of these cars."

Push pins, having various-colored heads, are placed in the map at the precise location in the community that the purchasers live. At the bottom of the map is a color chart explaining that pins with red heads represent roadster owners, pins with blue heads indicate touring car owners, while yellow and black-headed pins indicate coupé and sedan owners. White-headed pins indicate truck owners.

This map is said to prove not only a novel means of advertising, but it also serves as an effective argument to prospective customers that this particular make of car must be satisfactory or there would not be so many pins in the map.

Maybe It Isn't There

Do you remember the story of the man who kept a bass in the aquarium tank? He put minnows in one side of the tank and kept the bass away from the minnows by means of a glass partition. Time and again the bass would dive at the minnows, but he only snubbed his nose on the glass. After repeating this process a dozen times an hour for about three weeks the bass gave it up and kept away from the glass partition. The owner of the aquarium took out the partition, and to this day the bass has never attempted to disturb the minnows. This story reminds us of some salesmen. They try repeatedly to get a contract, but find that there is strong resistance—and eventually they stop trying. If the bass had kept on trying he might have had his three meals a day a la minnow. So with salesmen. It pays to keep on trying. Maybe the partition isn't there any more.

A Nameless Advertisement

AN advertising book that doesn't mention the advertiser is discussed by M. A. Berns in *The Mailbag*. This book, which is written for dealers in the building material field who handle cement, does not mention the name of the cement manufacturer (The Universal Portland Cement Co.) except in minute letters in the copyright notice. It is said to have been the outgrowth "of the knowledge that while hundreds of good selling ideas were scattered among the building material dealers of the country, no one had ever attempted to collect, consolidate and publish them for the benefit of all. It is a description of the best plans of several thousand dealers boiled down to 110 common-sense selling suggestions."

In the treatment of the text the dealer was given the center of the floor. His own plan was described as far as possible in his own words. It was aimed to impress the fact that the book was simply a medium by means of which each dealer could explain to all others the plan that he had found most successful. The results in good-will and in business have been

greater than if numerous books had been published on the subject of "we," "us" and "our product."

Educating Prospects

THE saturation point in the market for any product seems to be largely a state of mind, according to J .E. Bullard in *Printers' Ink*. That prospecting for new markets year after year is certain to bring success is illustrated by the methods of the Nicholson File Company, which recently found a market for files in American households. It is pointed out that although, in the past, files have been sold very largely as a technical product and to technical users. They have been sold to industries where their use is a necessity. They have been used by people who have been trained to use them.

Yet there is no tool aside from a hammer and a screw driver for which the average man can find more uses than he can for a file.

The company has begun to educate these average people. It is teaching the motorists the value of having in the tool kit the files that are made especially to brighten up the contact points on the electrical systems. It is teaching the householder what it means to have a collection of the right kind of files in the home.

While making the investigation for the campaign of education one householder was found who had forty different files in the home.

Efficient Circulars

ONE way of keeping form letters and printed circulars out of the waste-basket is to give the recipient a reason for reading it. The following plans, says F. E. Kunkel in *The Mailbag*, has been successfully used by a large manufacturing company:

A printed circular is usually enclosed with a form letter, since all that has to be said cannot be told in the narrow confines of a short, attention-winning, snappy sales letter. Clipped at the top of the letter and circular is a small 3½x7-in. plain white piece of paper, on which is printed in imitation of typing:

TO THE MAN WHO DECIDES

We all get lots of advertising matter. Most of it slides into the willow basket.

Not enough time to examine it closely; else more of it might survive . . . too bad!

Now, the enclosed LOOKS like a printed circular. But, in fact, it is a print of a personal letter which we sent to *thirty executives*. Nineteen of them replied with actual orders.

GOOD! We hope this does half as well. We'd prefer to write personally to all firms, but our Cyclometers warn us against such expense.

Won't you read the enclosure just as if it were a personal letter?

And then tell us what you think of it—with an order—perhaps?

Intermittent Advertising

WHAT would be your opinion of a manufacturer who put a costly electric sign on his factory and then ordered that current should be used for its illumination only three times a week, asks Willard C. Howe in *Class*. Or what would you think of an office manager who insisted on having his company's name on the front door on Mondays, Wednesdays and Fridays, but took the sign down Tuesdays, Thursdays and Saturdays? Yet these things are no more inconsistent than the policies of some business paper advertisers who hang up their signs in thirteen issues of the weeklies and in twelve issues of the semi-monthlies, with no regard for the possible buyer who, on looking for the sign in other issues of the same publications, is unable to find it, and goes elsewhere to buy.

It is pointed out that many business-paper campaigns are in the control of men who think in terms of *appetite* rather than in terms of *demand* and, sometimes, in terms of *demand* when they should be thinking in terms of *preference*. Trained in the handling of consumer campaigns for food products, wearing apparel, automobiles and other lines of like character, they think of advertising as a power which should lead an army of people to drop all business in hand and to rush around the corner to the nearest grocery or haberdashery or dry-goods store and buy.

When a highly technical account is treated in this manner the result is apt to be ludicrous, but the blame for the negative results usually falls on the publications used and not where it belongs, on the copy, the schedule, and sometimes the mediums chosen.

QUESTION	Yes	No
Are *all* purchases made through the purchasing department?..	145 (63.3%)	84 (36.7%)
Are purchase orders signed or otherwise approved by an official other than the purchasing agent?	28 (12.2%)	201 (87.8%)
If requisitions specify a particular make, can the purchasing department substitute satisfactory material?	196 (86.3%)	31 (13.7%)
Are salesmen permitted to interview officials other than the purchasing agent?	78 (33.8%)	151 (66.2%)
Is the purchasing department consulted in establishing standards or specifications for material?	206 (90 %)	23 (10 %)

An analysis of industrial buying.—*(Purchasing Agent)*

Reserve in Advertising

THE quality of reserve in advertising is as powerful as if it were the underlying motif in literature, music, drama or art. The most effective advertising is that whch leaves a feeling that much more could be claimed for the product advertised than is claimed. Translated into advertising terms, says Robert R. Updegraff in *Printers' Ink*, reserve is "not simply a matter of dignity or expression in copy or of treatment in layout or illustration; that is merely *restraint*. Reserve is the presentation of a product or proposition in such a way as to cause the reader to feel that much more could be said about it than has been said, were it necessary.

"Reserve is not primarily concerned with words or claims or pictures; it is a matter of the fundamental atmosphere or 'tone' of an advertisement or an advertising campaign.

"Reserve does not mean that copy must be short, and surely not that it should be stilted; short, stilted copy is not necessarily an earmark of reserve, but rather it is merely an indication of restraint.

"What, then, is reserve? It is a spirit, a spirit of appreciation of the reader's or the prospect's point of view. It says to him in effect, but not in words: 'When I tell you so-and-so (or show you so-and-so) I am leaving it for your own imagination and intelligence to fill out the picture; I know you will be honest about it, and I am willing to rest my case on an honest consideration.'"

How the Negative Appeal Is Used

AN interesting example of the adaptation of the negative appeal in advertising, put forward in a constructive way, says *Printers' Ink*, is the campaign of the Long-Bell Lumber Company of Kansas City. This company in endeavoring to sell fence posts to farmers quotes Government figures to show that at least 500,000,000 posts have to be replaced each year at an approximate cost of $100,000,000. As a means of overcoming this yearly waste, the book brings forward the creosoted posts, which it says will give excellent service for 50 years.



Price Cuts Justified by Production Economies

ALTHOUGH price cuts are the chief topics of conversation in the automotive industry, a writer in *Automotive Industries* points out that none of the changes is sensational and that most of them have been made by highly competitive companies. Revisions are said to have been based on the reasonable expectation of a continuance of heavy production. They have been made possible by a comparatively large volume of output and a consequent lowering of overhead and manufacturing costs.

It is pointed out that every cut since the depression began has been hailed in some quarters as a disaster. But one reason why the automotive industry has recovered from the slump more rapidly than most others is that it was almost the first to revise its prices and pass the reductions on to the public. And as a result the plants have been put on a capacity basis.

Although the majority of companies are keeping up with requirements from dealers, there are a number which are from one to two months behind on the deliveries of certain models. While it is true that buying in Eastern cities has shown a seasonal falling off, it is holding up well in States in the Middle West and is declared to be very good in the farming zone.

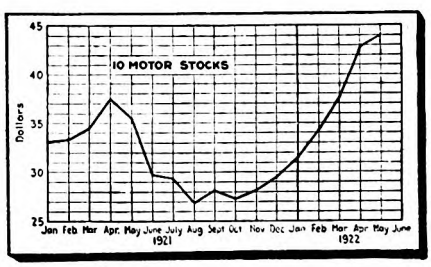
According to reports received by the National Automobile Chamber of Commerce, 246,600 passenger cars and trucks were produced by all makers in July, exceeding July, 1921, by 39% and the best previous July by 20%.

Difficulties in Automatic Transmission Design. A new device brought out abroad to give automatic continuously varying gear ratios inspires an article on this general subject. The Andreau device accomplishes an apparently automatic advance from the lowest possible gear ratio for starting to the highest possible ratio for running, by mechanical means, the centrifugal action of weights practically holding pinions more and more nearly stationary until the speed of the driving and driven members approaches one another. No test data are available, nor in fact any account of the use of the device. P. M. HELDT, *Automotive Industries*, 7-27-22, 1050 w. MAH.

Automotive Service Methods and Equipment. Article describing the service operations in the shops of the Yellow Cab Co., Chicago, which is claimed to have the world's largest motor-car fleet, consisting of 1,500 taxicabs. Some of the tools described include wheel and flywheel pullers, riveting fixture for drive gears, front axle bearing cup assembler, transmission case stand, frame straightener, tool for removing venturi tubes from carburetors, and others. HOWARD CAMPBELL, *American Machinst*, 6-22-22, 1400 w. MAH.

Economy and Precision in Connecting Rod Manufacture. Machining operations on the Hupmobile rods are described and machines on which most of the work is done are shown. Fixtures and other conveniences or time-savers shown and described. Care is exercised to secure parallel axes for piston pin and big end holes, the majority of subsequent operations being located by means of mandrels through these two holes. Straddle milling bearing caps, continuous drilling and milling, inspection and inspecting fixtures. J. EDWARD SCHIPPER, *Automotive Industries*, 7-20-22, 1750 w. MAH.

Machining Twenty Flywheels an Hour. Methods followed in the production of these parts in the Hupmobile shop, describing machine tools and fixtures used, inspection methods and equipment, and accuracy sought. J. EDWARD SCHIPPER, *Automotive Industries*, 7-27-22, 1100 w. MAH.



Average price of ten automotive stocks: Chandler, General Motors, Hupp, Int. Motors, Pierce, Stewart, Stromberg, Studebaker, White, Willys.—*(American Machinist.)*

How Pressed Steel Wheels Are Made. Recent machine tool developments which are an aid to manufacturing efficiency, the varied nature of process work and the wide possibilities of pressed steel production. Machines now being developed for advanced work. Discs of tapered section used for wheels. Photographic studies of the progress of the work. J. EDWARD SCHIPPER, *Automotive Industries*, 7-13-22, 2100 w. MAH.

What Constitutes a Perfect Motor Bus? Question asked and answered by G. A. Green, Chief Engineer, Fifth Avenue Coach Co., New York, in extensive and thorough review of this timely subject. He takes up each feature of the bus, frame height and width, center of gravity and advantages of having this low, effective brakes, short turning radius, internal gear rear axles, maximum speed, easy steering, acceleration and deceleration, springing, and many other similar detailed subjects. *Automotive Industries*, 6-22-22, 9800 w. MAH.

Motor Buses and the Electric Railway. Author presents statement that the bus can (and will) help the electric railway, and gives many examples of cities in which this has been proven. Interests of steam and electric roads as well as those of the consumer are best served by low motor vehicle taxation, since this will permit low cost operation and consequently low fares. ZENAS W. CARTER, *Automotive Industries*, 7-13-22, 3550 w. MAH.

Widespread Use of Motor Bus. Author points out that wide variety of conditions under which motor bus must operate prevents laying down any best type, since what would be best under one set of conditions might be practically the worst under other widely differing conditions. He argues for proper selection in all cases. Also for the single deck type in city work, for long wheel bases as giving loading capacity, stability and other desirable advantages, for cross seats and a central aisle, and for other features. Besides city buses, he takes up the intercity type, the country type, and presents the forms and types which are used in the majority of cases for these services. Also presents the case for the steam bus, widely used in England but not in this country. R. E. PLIMPTON, *Automotive Industries*, 6-22-22, 3250 w. MAH.

Carburetor Adjustment. Percent of carbon dioxide in exhaust gas bears direct relation to completeness of combustion and air-fuel ratio. Curves are given showing carbon dioxide percentage relation to air-fuel ratio, and also to completeness of combustion both by laboratory and road tests. Characteristic curves are given of two types of carburetors, results of which were plotted from road tests, showing how air-fuel ratio changes with change of mixture rate through carburetor. Procedure for sampling exhaust gases while adjusting carburetors on road are given and portable carbon dioxide indicator is described. Examples of carburetor adjustment by gas analysis are given. A. C. FIELDNER and G. W. JONES, *J. Ind. Eng. Chem.*, 7-22, 3500 w. CJW.

Blended Fuel, a Limited Success in France. Gasoline is expensive in continental Europe, and a number of countries, including France and Germany, are using alcohol liberally. In France one of the largest users of mixed fuels is the Paris General Omnibus Co., which is using a 50-50 alcohol-benzol mixture. After 11 months trial of this mixture, it is said, that the buses have lost no time or accuracy because of the new fuel, and are being operated more cheaply than on straight gasoline. The article tells of the various fuels in use, their prices, etc. W. F. BRADLEY, *Automotive Industries*, 7-13-22, 2050 w. MAH.

Can Less Volatile Fuels Be Used Successfully? Carburetor experts take up this timely topic and answer it in the affirmative. Proper fuel preparation prior to combustion is important and perhaps necessary. This results in formation of continuously homogeneous mixture without liquid film or drops and at the lowest possible temperature. Advantages and disadvantages of present methods of heat application, including use of hot air, heating of inlet manifold, hot spot and others, are given and discussed in detail. F. C. MOCK and M. W. CHANDLER, *Automotive Industries*, 6-22-22, 5700 w. MAH.

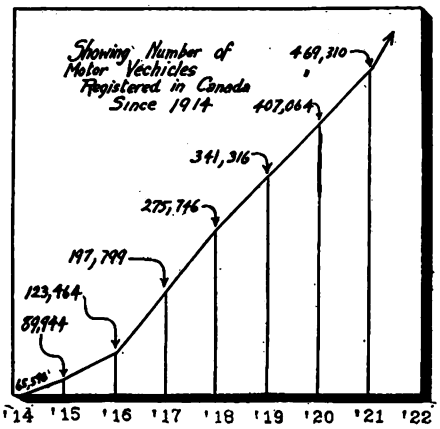
How to Secure Effective Lubrication. Abstract of paper delivered before Summer Session of Society of Automotive Engineers. Author says that crankcase oil must be removed and replaced by fresh oil frequently in order to obtain good lubrication and offset the effects of dilution. Describes factors on which oil consumption depends, and dwells on each to show how better lubricaiton may be brought about. G. A. ROUND, *Automotive Industries*, 6-22-22, 1000 w. MAH.

Power Losses in Automobile Tires. Preliminary results on power losses in tires show that, in general, the loss increases directly with increase in speed or axle load and that it increases quite rapidly with decrease in air pressure below standard. Tractive effort has comparatively small effect on power loss. There is a wide variation in the power loss in different tires run under same conditions. Some makes of tires show larger power loss than others and fabric tires as class show considerable greater loss than cords. Study, if continued, should give information which will help in developing better specifications and be an aid to manufacturers. W. L. HOLT and P. L. WORMELEY, *Bureau of Standards*, Technologic Paper No. 213, 1922. 10 pp. CJW.

Increasing Life of Tire Molds. Cast iron molds are used for curing tires, and alternations of heating and cooling make the metal brittle so that the lugs break off. This generally happens after 60 to 70 heat cycles, and is a serious matter because the molds are worth $700 or

Related Articles

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The number of motor vehicles registered in Canada since 1914.—*(Canadian Machinery.)*

$800. The author tells how they may be reclaimed by welding, and goes into the details of building up new metal around the broken edges. He gives the cost of this, step by step, from which it appears that one of these molds may be salvaged for as little as $70. A. M. COADY, *Automotive Industries*, 7-13-22, 900 w. MAH.

Radiators for Aircraft Engines. Characteristics which determine value of radiator in discharging its functions are considered in detail. Measurements of air flow through core, of head resistance, of cooling power, and of geometrical characteristics are described and an exposition given of relations between these and conditions under which radiator operates and its characteristics of form and construction. Work was based on special laboratory investigations, including laboratory tests of over 100 types of radiator cores. Detailed record of performances of these cores included. S. R. PARSONS and D. R. HARPER, Bureau of Standards, Technologic Paper No. 211 (1922), 187 pp. 50 cents. CJW.

Metal Construction. Author, a prominent Italian airplane constructor, claims that airplane theory and design are now ahead of and waiting for the production of better metals. By this he refers to stronger light-weight alloys on the order of the magnesium-aluminum compounds, magnalium, and the like. Before arguing the case for the various metals, he shows that wood really is an unsuitable airplane material. It is readily distorted, deteriorates quickly through weather conditions, breaks easily by splitting, lacks homogeneity in density and strength, and readily absorbs moisture, which further decreases its strength. It no longer presents (by comparison with a few metals now available) the advantage formerly claimed for it of great strength in proportion to its weight. Continued, the later part apparently taking up the metals in more detail. RODOLFO VERDUZIO, *Aerial Age Weekly*, 6-26-22, 2200 w. MAH.

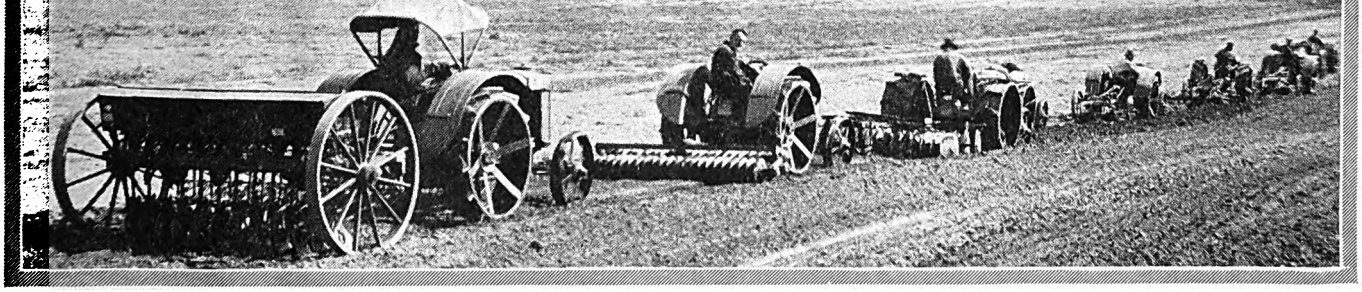
Theory of the Slotted Wing. The experiments of Handley-Page and Lachmann have shown that the use of slots through the wing of an airplane permits the use of the wing at higher angles of attack, and thus gives greater lift. The principal other advantage lies in the ability to vary the coefficient of lift, and hence the speed within considerably wider limits. The author discusses all the advantages and disadvantages of the slotted forms in great detail, and from the viewpoint of an aeronautic engineer. A. BETZ (Göttingen, Translated by N. A. C. for Aeronautics) *Aerial Age Weekly*, 6-22-22, 3100 w. MAH.

Diesel Development in the British Navy. Another part of an article on this broad general subject. This part takes up the earlier engines which gave such good results in the "Marshal Soult," a monitor, during the war, and the subsequent improvements made in them. Also the larger engines with a total power of 2500 hp. for a twin-screw oil tanker, and a subsequent development of this, a single cylinder unit to develop 1000 b. hp. The latter was but the earlier experimental form of what was intended to be a six-cylinder engine of 6000 brake horsepower. Details of this are given, also of the fuel used, of the successful test and also of other engines and their tests. SIR GEO. G. GOODWIN, *Motorship*, 7-22, 2600 w. MAH.

New Instrument for Checking Gear Tooth Profiles and Spacing. This is a mechanical tool known as the Odontometer. It is intended for production work as differentiated from laboratory or test room practice. The article describes the device thoroughly, and the work it does. *Automotive Industries*, 7-27-22, 450 w. MAH.

Related Advertising

Economical steam pressure regulators.....1458
Consulting industrial engineers.....1461
Reliable investment securities.....1517
Reliable steam traps.....1459



BUILDING·CONSTRUCTION

A Record Year in Building

THE chief problem confronting the building industry at present, in the opinion of the *American Contractor,* is the necessity of finding a way around the car shortage and car priorities. It is reported that the fear of a car shortage for building materials and the slowing down of production on account of coal scarcity have operated to lessen projected planning for construction.

However, according to the F. W. Dodge Company, contracts awarded during the month in the twenty-seven Northeastern States amounted to $350,081,000. This was a 2% increase over July, 1921. It is greater than any previous monthly total except the record figures of April and May of this year. The July figures brought the total for the first seven months of this year up to $2,041,065,000—which amount is 60% above that for the corresponding period of 1921.

July building contracts in the Central West amounted to $124,655,000—the largest monthly figure on record for this district. The July figure was 19% ahead of June and more than double the amount of July, 1921. During the first seven months of this year construction started in this district has amounted to $595,688,000—an increase of 55% over the corresponding period of last year.

In the opinion of Milton V. Ayres, statistician and analyst of the Associated General Contractors of America, more new building will be undertaken in the year 1922 than in any previous year of the country's history. He believes that although great activity in building will naturally tend toward higher prices of materials and will probably prevent any considerable reduction in building wages, no difficulties will be experienced in financing proposed building projects.

Simplified Designing Methods. Second, and final, installment of an article showing how Professor Beggs, of Princeton University, computes stresses in structures hard to analyze by ordinary mathematical methods. This installment illustrates the apparatus used in making the tests and gives examples of how the work is done. Well illustrated by half-tones of reinforced concrete buildings of forms similar to those in which this system of computation is particularly applicable. *The American Architect,* 7-19-22, 4000 w. EMcC.

Structural Design. A discussion of the many methods used by steel designers to make allowance for net section of steel members pierced by rivet holes. The subject is fully illustrated, methods in common use are shown to be in error and several diagrams are presented whereby true net sections may be obtained. Prof. C. R. YOUNG, *The American Architect,* 8-2-22, 4500 w. EMcC.

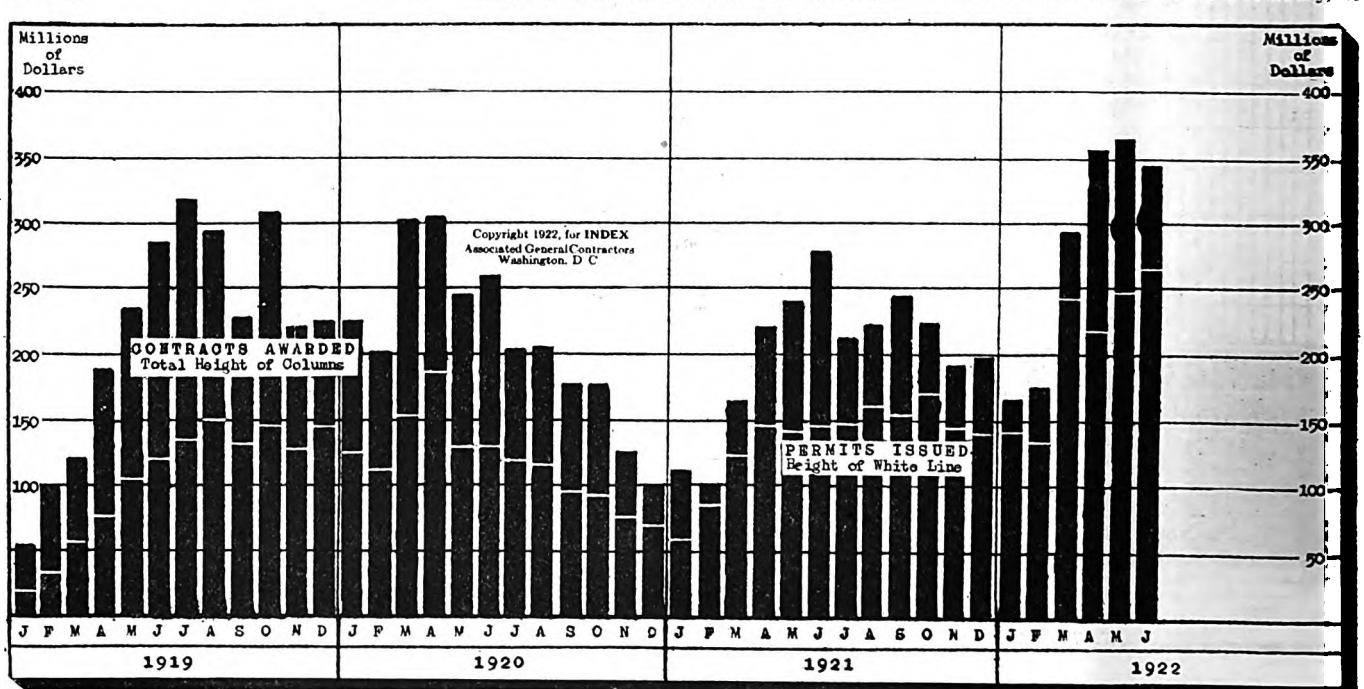
Cardboard Models. The first article of a series on the use of models in architectural work and how to make them. This supplies a need long felt as there is not at present in the English language anything authoritative on the making of cardboard models for architects. Illustrated. LEROY GRUMBINE, *The American Architect,* 8-2-22, 3500 w. EMcC.

Costs of Buildings. The twelfth in the series of building costs. Costs contributed by architects are given of eight residences, one hotel, one dormitory, one court house, two office buildings, in four widely separated States. Contracts awarded in 1920, 1921, 1922. Gives total costs and cubic foot casts with description of character of work and equipment. *Am. Architect,* 8-16, 1 page. EMcC.

Enlarging and Remodeling a Building. The office building of the Aetna Life Insurance Company, Hartford, Conn., had four stories added to height. On account of weak foundations independent foundations for columns were run to bedrock 40 ft. below street level. On top of columns were placed trusses with cantilever ends from which were suspended the 7th, 8th and 9th floors, the trusses being in the 10th story. Work described with photographs. DONN BARBER, *Am. Architect,* 8-16, 3000 w. EMcC.

Fireplaces. The essentials of fireplace design and construction. Maximum height of opening should not exceed 4 ft., no matter what the width. Cross-section of front should be proportional to cross-section of room. Flue area about 13 sq. in. for each square foot of fireplace opening. Throat improvement. Drawings given for proportioning throat and wind shelf to prevent smoking of fireplace. Illustrated by examples. *Am. Architect,* 8-16, 3000 w. EMcC.

What It Pays to Know About Heating. Chapter VII. Covers sizes of pipe to use for two-pipe jobs. Improper sizes for distribution of steam necessary to

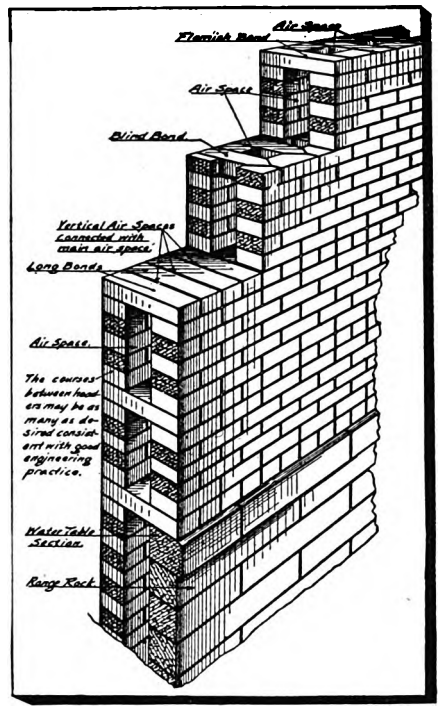


Total contracts awarded versus permits issued. Contracts awarded in 27 Northwestern States and permits issued in 163 cities.

handle connected radiation, have more frequently been source of trouble in defective systems than any other cause. Gives direct reading chart to obviate extensive and complex computations. M. WILLIAM EHRLICH, *Sanitary & Heating Engineering*, 7-28-22, 1000 W. CS.

Overhead System of Hot-Water Heating Becoming More Popular. Gives review of effect of national advertising campaign on use of overhead piping system for hot-water installations. Particularly adapted for small buildings, but gives example of successful use in five-story apartment. Can be as combination, heating certain radiators with old method of mains and risers and others with overhead circuit. Since hot water by overhead system flows to top floor and then spreads around distributing header, top radiators being heated first; these are made a few sections smaller than room measurements require. FRANK STEELE, *Sanitary & Heating Engineering*, 7-28-22, 1200 w. CS.

Alkali Attack on Concrete Roads and Building Brick. Notes on disintegration in rice field country of Glenn County, Cal., caused by alkali-bearing water. Leaner mixes, when subjected to alternate wetting and drying in alkali water, yielded to alkali attack more rapidly and completely than richer mixes. Under no conditions of experimentation with unprotected concrete was entire immunity to alkali water established. Brick buildings in district show evidences of incipient disintegration. IRVING FURLONG, *Eng. News-Record*, 7-13-22, 2000 w. CS.



Shope concrete brick hollow wall construction. Many large buildings have been constructed of Shope concrete brick, including the Montgomery-Ward building, Portland, Ore., in which 1,500,000 face and common brick were used, and a $300,000 labor temple, one of the finest in the country. The Shope brick-making machine can be adjusted to turn out various sizes of brick and by manufacturing a quantity of 12-in. headers, a 12-in. wall with a 4-in. air space can be built. Blind headers can also be molded if desired, and used as shown in the drawing.—*(Concrete)*

Protecting Pavement Edges. Where pavements end or abut against softer surface trouble is experienced in maintaining edges. Where railway companies are required to maintain pavements between stated lines efficient means of separating areas should be used. New application of steel paving guards demonstrated at Lakewood, suburb of Cleveland. In concrete headed was set 3-in. steel paving guard. Also useful in original construction as shoulders can be constructed in advance of track work. *Highway Engr. & Contractor*, 4-22, 800 w. CS.

Concrete Construction by the U. S. War Department. Complete details of design and construction of concrete motorship fleet. Up to certain size concrete motorvessel is practical. Failure of Shipping Board's concrete ships not due to concrete as material for hulls, but to hasty construction, inexperience, too large a vassel and lack suitable machinery. Two three cylinder Diesel engines used. Average fuel consumption 4.1 gallons per nautical mile, and cost 22 cents per mile. Specially designed electrical controlled steering gear, average speed 15 knots. *Motorship*, 8-22, 300 w. CS.

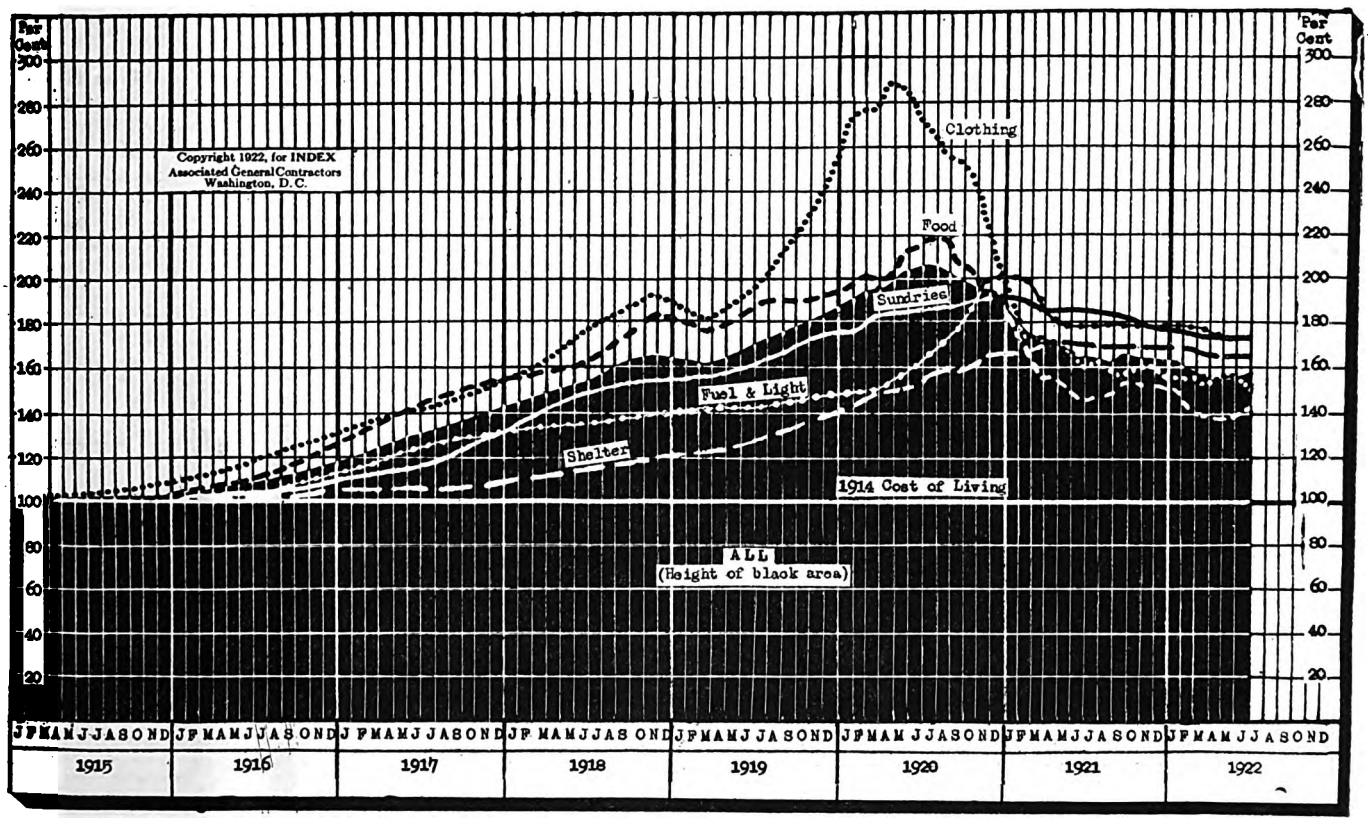
Quebracho, a heavy and fine-grained wood found in several South American countries, is used for furniture and interior finish, but its greatest value lies in an extract derived therefrom which is used in tanning high-grade leathers. —*American Lumberman.*

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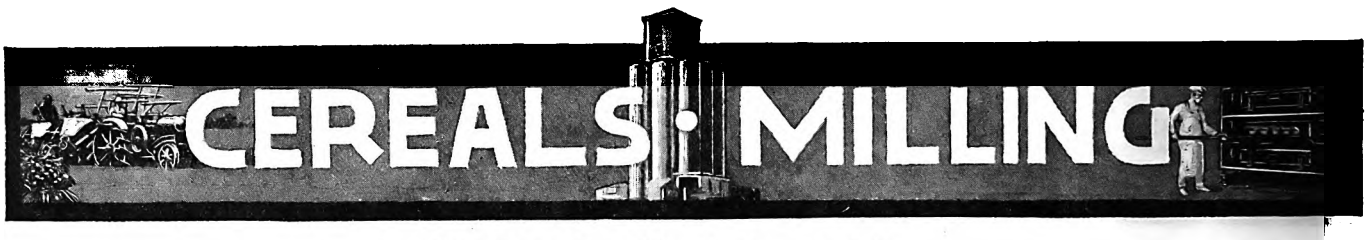
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Cost of living changes. Chart by *Index* from figures from the National Industrial Conference Board.



Big Crops Resulting in Lower Prices

ACCORDING to the *Price Current Grain Reporter,* grain prices have sagged to a point where there is little profit to the producer, and it is predicted that the general business world will suffer if prices remain at this low level. Government reports place the North American yield of all grains at 1,125,000,000 bushels, or 30,000,000 bushels more than last year's harvest, and suggest an exportable surplus of over 400,000,000 bushels. It is pointed out that if the world's financial position were normal there would be little trouble in disposing of such a quantity of grain, but the trade is waiting to see if the European nations can finance all of their theoretical needs.

Meanwhile, in the opinion of the *Western Banker,* the farmer will refuse to market his wheat unless he receives a price he considers adequate. Unless at least one dollar a bushel can be secured he will dispose of only such a portion as will meet his immediate needs. It is believed that we shall have a good demand for wheat during the year and that in the end foreign buying will be so financed as to add to the utilization of all the crop that can be spared.

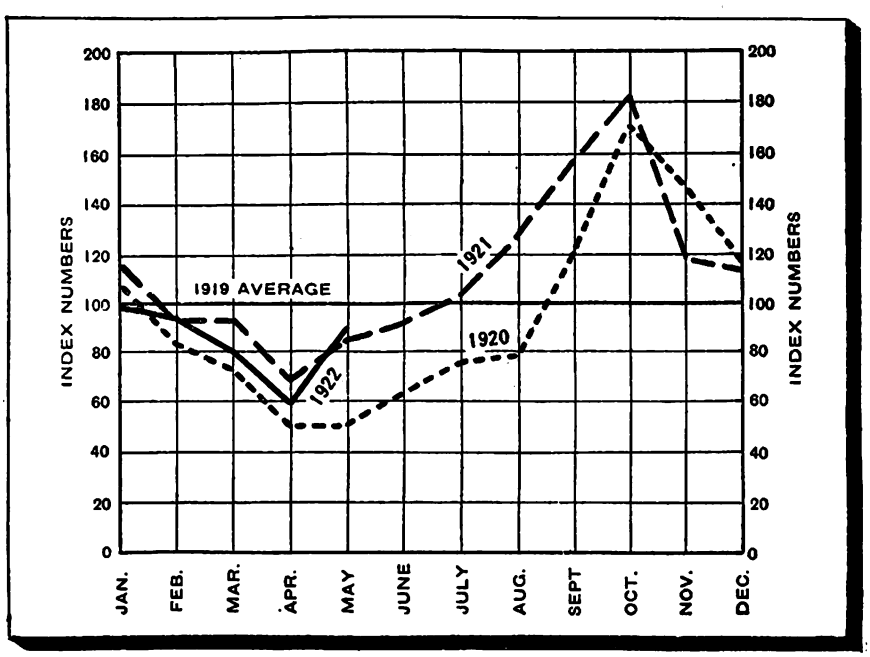
But it is pointed out that the real feature of the situation is the effect on business revival from the return to be secured from the sale of the 600,000,000 bushels of wheat that can be marketed. This income is expected to have a favorable influence upon bank deposits, liquidation of loans and trade generally. If the selling is delayed, the impetus will be felt well into the autumn.

Federal Grading of Grain. True grade should indicate results to be obtained from wheat when milled. Uniform quality of wheat necessary to turn out uniform product. Grading of wheat involves classification of wheat as to character and fitness for manufacture, and comparison of value of wheat within any one class. Five classes of wheat. Gluten test and protein test determine per cent of dark vitrous kernels. Milling value considered. Determined by test weight per bushel. Yield of flour varies directly with weight. Moisture content of wheat influences keeping quality and value for milling. Shortage of good milling wheat. Due to deterioration of milling value of wheat in given location and way in which crop is handled. W. M. CUNNING, *Modern Miller,* 7-22-22, 1200 w. J. B.

Fumigation and Tempering of Wheat. Liquid carbon disulphide is decidedly injurious to conditioning and tempering wheat for milling and is also injurious to flour made from such wheat. Gas is also injurious but not to same extent as liquid. Since some form of fumigation for weevil is necessary suggests only use of gas from carbon disulphide. A. W. ESTABROOK, *Millers' Review,* 6-22, 500 w. CJW.

Water. Next to flour in baking, water is probably most used. Has important effect on character of bread. Waters with fair degree of permanent hardness are best to bake with. They appear to strengthen and toughen the gluten, the carbon dioxide gas formed in dough is better enmeshed and finer grain and texture is produced in bread. *Bakers Rev.,* 7-22, 1000 w. CJW.

Flour and Fermentation. Necessary for leaders of baking and milling industries to acquaint themselves with chemistry applied to their industries. Cereal chemist should understand chemistry of bread-making. Flour and fermentation important problems. Must study all flours from viewpoints of miller and baker. No flour, unless decomposed, but what will produce salable bread if studied. Tests should cover ash, moisture, color, soundness, strength to undergo fermentation. Study of gluten best way of determining value of flour. Method described. Reporting of results of greatest importance. Most satisfaction obtained from flours of approximately 75% to 85% extraction, medium granulation, fairly "sharp" to touch, with light cream color. Fermentation studied same way as flour. Different flours require different fermentation. Length of fermenting primary importance. Depends upon yeast, salt, temperature, size of dough to be fermented. Accomplished by sponge or straight dough methods. Methods optional. Straight dough method more popular, because less space is required and less handling of dough. E. B. CLARK, *Bakers Review,* 8-22, 2500 w. JB.



Index of crop marketings. Relative marketings 1919 = 100. *(U. S. Census Bureau.)*

Molders. Mixer was most important machine, but to-day molder supplants it. Molds with exact uniformity approximately 7000 loaves an hour. Eliminates use of dusting flours, makes more uniform and better loaf, promotes cleanliness and more healthful working conditions, requires little space for storage. Various molders have different working principles. Illustrations and descriptions given of different machines. Different doughs work differently. *Bakers Review,* 8-22, 1500 w. JB.

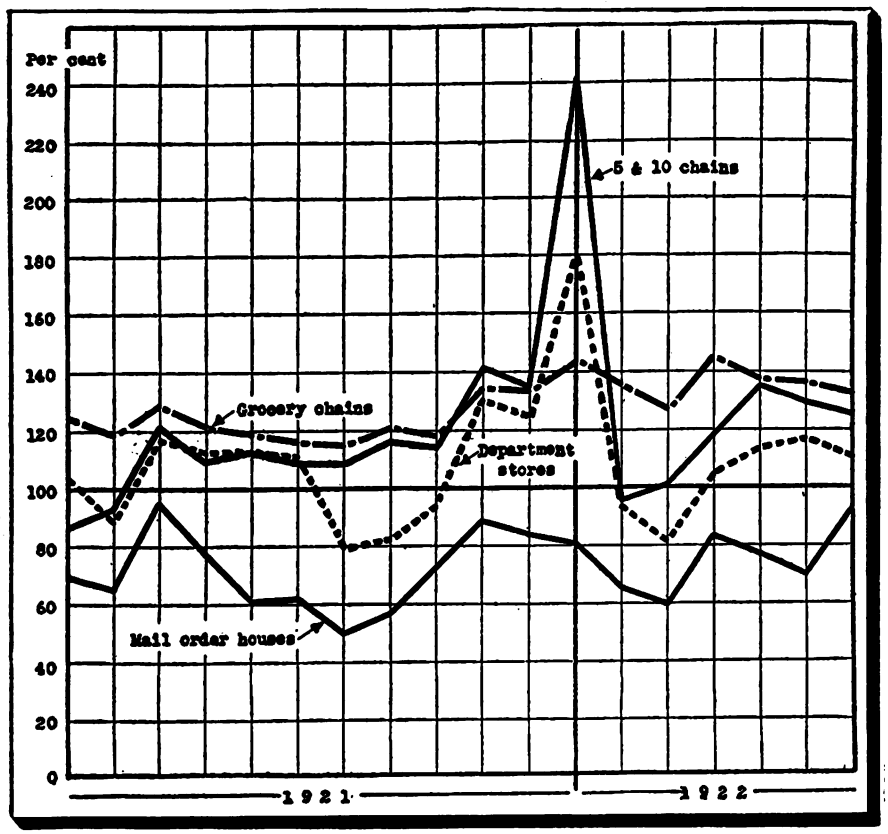
Self-Rising Flour. Serious menace to baking industry in South. Leavening ingredients added usually calcium acid phosphate and sodium bicarbonate. Hard wheat flour best for bread, but practically all samples examined were from soft wheat. In most cases no relation between amount of acid ingredients and soda. Indicates lack of control in manufacture. Flours made inferior grades of flour yielded biscuits of grayish and dark, uninviting color and poor flavor. B. R. JACOBS, *American Food J.,* 5-22, *Bakers' Review,* 7-22, 1200 w. CJW.

CLOTHING GARMENTS

Better Outlook for Garment Trade

ACCORDING to the *American Cloak and Suit Review* a spirit of optimism is prevalent among the majority of ready-to-wear buyers and merchandise men. A survey among members of the National Wholesale Dry Goods Association shows that the volume of sales has been only slightly less than for the same period in 1921. Many of the members are said to consider the prospects for fall business extremely good on account of the small stocks in retailers' hands and the advancing raw material markets. Many wholesalers report that their purchases for fall and winter are almost complete.

The New York Evening Post points out that when a comparison is made between retail sales in June, 1921, and June, 1922, a substantial improvement in business is evident. The fluctuations in the monthly value of retail trade in different classes of establishments during 1921 and the first six months of 1922 are indicated in the accompanying chart. The data have been compiled by the Federal Reserve Board and are based on reports from 159 department stores, 4 mail-order houses with a nation-wide business, 16 chains of grocery stores and 4 chains of five-and-ten-cent stores. Average monthly sales for 1919 are taken as the base figure of 100 for the index of dollar sales.



Retail Trade Is Better Than a Year Ago

The index for mail-order houses sales rose from 62 to 91, that for the chain groceries from 116 to 133, that for the 5- and 10-cent stores from 109 to 124 during the past 12 months, while that for department stores remained stationary at 110. The chart reveals the great importance of the holiday season in stimulating sales by department stores and five- and ten-cent stores, compared with other retail establishments. The gain in sales by mail-order houses during 1922 is of special significance as indicating the increased buying power of farming communities, following the advance in prices for agricultural products.—*(N. Y. Evening Post.)*

Style Forecast. Joint conference of style committees representing I. A. C. D. and National Retail Clothiers Association make report on styles for spring and summer seasons of 1923. Attire for summer to be of sport nature with Norfolk type predominating. Fancy effects in sports coats recommended. Demand for top coats growing. Popular model for motoring will be of raglan shoulder type. Materials used should be whipcords and gabardine. *Manufacturing Clothier*, 7-22, 2000 w. HHH.

Economic Conditions as Related to Clothing Industry. Question of design closely interwoven with economic and financial results of various branches of clothing industry. Important to provide steady income for workers; continuity of employment necessary to establish cordial relationship between employer and employees. Waste in manufacturing and distribution methods must be reduced in order to bring prices within reach of greatest possible number of purchasers. Little advantage in price-cutting, disregarding quality. Quality standards essential to lasting success. Organization needed in clothing industry. Truthful advertising must be insisted upon in order to create confidence. DAVID KIRSCHBAUM, *Manufacturing Clothier*, 7-22, 2500 w. HHH.

Linens for Dresses. Classification of goods handled in warehouses. 1. Brown cloths used in tailoring or clothing trades. 2. Cloths fully bleached as shirting linens, sheetings, etc. 3. Articles made from fully bleached cloths as handkerchiefs, tea cloths, etc. First division includes goods easily woven. Dress and suiting materials sold in natural colors as well as bleached and dyed. For export market linens are made in natural cream shades as well as common brown holland. Linen superior because of good wearing qualities. Difference between cotton and linen is in respective basic fibres. Washes easily and preserves appearance. Silk and linen rival men's tropical suitings. Linen more in demand. Improvements in finishing processes made. Dyeing of linen also improved in last decade. Yarns dyed before weaving or bleach pure white and dye cloth when woven. Cloths being produced with mercerized cotton warp and linen weft called "union" cloths. Limited stocks on market. ALFRED S. MOORE, *Canadian Textile Journal*, 7-18-22, 1725 W. JB.

France Favors Lace. Lace predominating fabric in new models. Either complete gowns of lace or gowns in which lace predominates favored by leading French style creators as generally accepted styles for summer seasons. Vogue for floating panels, drapes and wide, flowing sleeves afford opportunity for displaying lace to best advantage. *Dress Essentials*, 7-22, 500 w. HHH.

Technical Tests of Dry Cleaning Processes. Processes now used to clean and renovate clothing play important part in checking epidemics. Processes recently evolved at Mellon Institute in Pittsburgh do not have slightest deleterious effect on cloth, but aid in renovation, thus enhancing value of apparel. Results of research expected to be great help in combating disease. These tests first effort to determine germicidal efficiency of dry-cleaning industry. *Cleaning and Dyeing World*, 5-22, 1600 w. HHH.

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Use of Concrete Increasing

THE ingenuity that is being exercised by architects today in designing concrete structures is a notable evidence of the increasing use of concrete as a building material. Its permanency and fireproof character are of course responsible in a great measure for its popularity, but the adaptability of this material is another argument in its favor. *Cement and Engineering News* points out that concrete has the apperance of limestone, the plasticity of terra-cotta and that there are no restrictions in the size of the blocks that can be made. Moreover, it has an amazing variety of textures, and with suitable reinforcement can support the heaviest loads in column and lintels without difficulty. In work in which there is much repetition, such as a set of windows, or in columns and finials, it is especially suitable because of its freedom from inaccuracies. And because of its economy architects are turning more and more to the use of concrete for all kinds of architectural adornment.

Concrete is also coming into use for drainage pipes. Its great strength to withstand the increasing load of highway and railroad traffic and its durability are the chief advantages. Many states specify concrete culvert pipe exclusively, and others admit concrete pipe in competition with vitrified clay or corrugated metal encased in concrete. Concrete railroad ties are also beginning to be used and are said to prove satisfactory.

An indication of concrete construction now under way is furnished by the recent report of the United States Geological Survey. Shipments of Portland cement during June are reported to be 13,470,000 barrels—2,225,000 barrels more than the production for June, 1921. Cement mills throughout the country are said to be producing at full capacity.

Controlling Quality of 400,000 Cu. Yds. of Concrete. Unusually uniform quality concrete obtained throughout construction of Queenston-Chippewa development, by using complete system of inspection. In 13 mos. 410,000 cu. yds. placed from 21 different plants scattered along 8½ miles of canal. Describes methods used to control strength and quality and same time reduce quantity of cement used. RODERICK B. YOUNG, *Concrete*, 7-22, 2000 w. CS.

Concrete Products Plant Problems. Discussion of curing rooms and time. Suggestion for two-level plant, with machine rooms below and above curing floor. *Concrete Products*, 6-22, 700 w. CS.

Improving Concrete Sand by Classification. Reclassification of sand involves throwing out grains finer than 48-mesh. Description of methods and machines used and results obtained. E. SHAW, *Concrete Products*, 6-2, 2000 w. CS.

Concrete Regulations Governing Form but Not Standards. Gives Concrete Institute regulations covering arrangement of material, units of measurement, abbreviations, and spelling. *Eng. World*, 7-22, 1500 w. CS.

What Makes a Good Molding Sand? Two conditions required for good molding sand: bond and porosity, or in other words: alumina and silica. Bond is controlled by varying alumina or iron oxides. Silica content governs porosity. Gives varying requirements for different metals, sizes, finishes; and chemical and physical characteristics of several American sands. EUGENE W. SMITH, *Rock Products*, 7-15-22, 1000 w. CS.

Removal of Clay from Sand and Rock. Continued article. Covers methods of washing samples and superiority of one over others. EDMUND SHAW, *Rock Products*, 6-3-22, 4000 w. CS.

Specification Reminder for Concrete Work. The first installment of a detailed specification outline for concrete work, both plain and reinforced. Intended to be a checking list so that specification writers will not forget items of importance in preparing specifications for concrete work. *The American Architect*, 8-2-22, 2500 w. EMcC.

Crushing Plant for a Filter. Description of city stone-crushing plant for filter use. This use offers suggestion for market for large quantities of stone in other communities. *Rock Products*, 7-15-22, 1000 w. CS.

Washing Without Stripping. Description of plant and methods used for successfully handling sand and gravel deposit with very heavy overburden top soil by double washing. *Rock Products*, 7-1-22, 700 w. CS.

Fire Clay Refractories. Little real scientific work has been done. Problems of manufacturers. Historical. Origin of fine clay. Method of mining depends upon amount and character of overburden. In Kentucky deposits are worked on principle of drift mining. Definite proportions of flint clay, plastic clay and calcine are mixed with water and ground to proper consistency. Then goes to moulding tables. (To be continued). C. E. BALES, *National Engineer*, 7-22, 2000 w. CJW.

Manganese for Improving Quality. All light burning clays which can withstand kiln temperature of 1950° can be colored with ground manganese. Colors can be improved, unsightly colors changed to popular shades, and beautiful effects produced. Methods and results given for using manganese oxide. *Brick and Clay Record*, 7-11-22, 800 w. CS.

Early History of Blue Asbestos. Description of mining methods and manufacture. Found nowhere except Asbestos District of South Africa. Blue asbestos much stronger than white, but much harsher and requires special machinery to work it. *Asbestos*, 7-22, 500 w. CS.

New Stucco Lath Made of Burned Clay. Description of newly patented clay stucco base. Made in hollow square shape, then broken apart, forming four slabs 8 in. wide by 12 in. long by ⅝ in. thick. Slabs perforated to permit nailing to wall and sides roughened something after fashion of hollow tile block and stucco readily adheres to them. Cheaper than all wood or all brick dwellings, and requires no special machinery to manufacture. *Brick & Clay Record*, 6-27-22, 800 w. CS.

Use of Lime and Gypsum on California Soils. Covers nature and functions of lime and gypsum, need of lime on heavy and on acid soils, when and how gypsum may be used. *Cement, Mill & Quarry*, 6-20-22, 1000 w. CS.

Putting New Jersey's Potash Marls on a Paying Basis. First of three articles. Covers: history of material, early development, uses, plans of numerous producers. JOHN H. RUCKMAN, *Rock Products*, 7-1-22, 2000 w. CS.

Mineral Aggregate Specifications for Asphalt Pavements. Covers physical properties essential to success. There are as many different classes mineral aggregates as there are deposits of rock and gravel and their properties cannot be controlled further than to regulate maximum size of particles and variation in sizes. Covers specifications for four classes asphalt paving mixtures: (1) sheet asphalt wearing surface mixtures, (2) asphaltic concrete with material passing 10-mesh sieve predominating, (3) asphaltic concrete with substantial proportions both passing and retained on 10-mesh sieve, (4) asphaltic concrete with preponderance material retained on 10-mesh sieve. ROY M. GREEN, *Rock Products*, 5-20-22, 4000 w. CS.

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Higher Prices of Drugs Probable

IN spite of the fact that the coal and rail strikes have slowed up the delivery of raw materials, the prospect for renewed activity in the drug trade continues to be good. Although price changes recently have been of minor importance, nearly all materials are in a strong position, and in many cases the tendency seems to be toward higher levels.

Drug and Chemical Markets report that many favorable replies were received to a questionnaire recently sent out to manufacturers concerning the chemical situation. A number of manufacturers testified to a marked increase in sales in the last few weeks, and the general consensus of opinion was that the general trend in sales is steadily improving.

The New York Commercial points out that the buying movement is above the average usually seen at this season of the year, as August is generally one of the dullest of the twelve months. Consumers appear to have allowed stocks to run unusually low, and replacements now are hard to make. In the meanwhile the position of the domestic market has stiffened considerably since imported offerings are not so much of a factor, owing to the fact that the price of these materials averages somewhat above the domestic. Business, on the whole, is said to be considerably better than it was a year ago. Prices then were beginning to fall, and limited business was the rule. Now there is no slump in demand.

Photographic Emulsions. Object of investigations now being conducted by Bureau of Standards is to standardize methods and necessary conditions for testing photographic light sensitive materials. At present data is not comparable because of use of different methods. To account for variations to be met with in different plates, brief description of preparation of an emulsion is given. This is followed by discussion of different classes into which plates may be divided according to speed and color sensitiveness. Relation between exposure and density of negative is discussed together with development characteristics of plates. Apparatus used in testing is described, and reasons are given for adoption of light source used. Methods of studying color sensitiveness are explained. Method of testing resolution is described and effects of irradiation and halation are discussed. Discussion of results and interpretation of graphs precede the 86 charts, which show data on practically all plates and films made in the U. S., trade names of emulsions being omitted. Bureau of Standards, Scientific Papers, No. 439 (1922). 120 pp. 35 cents. CJW.

Zinc Oxide. Leaded zinc oxide (leaded zinc) consists of zinc oxide and varying amounts of lead compounds. High leaded contains at least 60% zinc oxide, low-leaded at least 93%. Specifications contain method of sampling and laboratory examination. Officially adopted by Federal Specifications Board, Feb. 3, 1922. Bureau of Standards, Circular No. 88, 2nd Ed., 7-3-22, 8 pp. CJW.

Phospates Solubility as Affected by Hydroxides. Deals with important factors pertaining to permanent systems of fertility. Covers: Principally free mineral acids and reversion to insoluble forms of soil, and influence of organic matter on availability. GEORGE A. OLSON, *Cement, Mill & Quarry*, 6-20-22, 700 w. CS.

Chrome Mordants and Chrome Dyes. Chrome one of the oldest of mordants. Wool should be well scoured and rinsed. Classical method consists of application of chromium to cleaned wool, and almost always yields level shades. Wool boiled for 1¼ hrs. with bath of from 1% to 4% bichromate of potash and 1% to 3% crude argols or cream of tartar. Amount of chromium used will depend on shade. Too rapid boiling is chief cause of uneven mordanting. Dyeing carried out in acetic acid solution. "After chrome process" consists in adding chrome mordant to spent dye bath and further boiling. Has some advantages in dyeing piece goods with plain or mercerized cotton effect threads or pencil stripes. Cassella's chromate process or "meta chrome" process consists in adding both dye and mordant to bath at same time. Used for dyeing loose wool of better sort and slubbing and yields shades of particular fastness if dyes are properly selected. For fine, heavy, full shades old chrome-mordant process is ideal one where output is secondary. Where output is of primary consideration, the chromate bath commands attention while for striped effects the after-chroming method is to be recommended. *Textile World*, 7-29-22, 1500 w. CJW.

Paper Pulp with Chlorine. Principle of process consists in mild alkaline treatment at low temperature, continuous chlorination of non-cellulosic material by means of chlorine hydrate (chlorine water); continuous solution of products of chlorination in soda solution; and final bleaching of pulp by means of bleaching powder or calcium hypochlorite. Consumption of caustics and chlorine can be adjusted so as to be proportional to amounts yielded by electrolysis of salt, thus becoming unnecessary to recover caustic from spent liquor. Application to straw described. DE PERDIGUIER, *Paper Industry*, 8-22, 2400 w. CJW.

Forest Products Laboratory. Work for coming year includes study of following problems: Chemistry of pulps, suitability of American woods for pulp, fundamental studies of the bleaching of pulps, fundamental studies of the soda pulping process, the sulphate pulping process and the sulphite process; flax straw as a source of paper pulp; pulp and pine wood decay, pulp and paper mill wastes, including utilization of bark and fiber recovery. *Paper Trade J.*, 8-17-22, 2000 w. CJW.

Alkali Recovery. This paper does not limit itself to discussion of designs and operation of "recovery room," by which name we usually refer to room containing smelters and incinerators, but to all those features which affect recovery from time the chemicals enter digester to time they are returned there to be used again. Two main factors: Prevention of dilution and prevention of losses. Eighty per cent recovery is considered good operation. C. B. TEXTOR, *Pulp Paper Mag.*, 7-6-22, *Paper Mill*, 7-15-22, 2500 w. CJW.

Iron in Activated Sludge. Iron plays very important role in activated sludge process and difference in iron content explains difference in color, flocking and settling of various sludges which are formed in activated sludge plants. Attention is also drawn to the M-7 organism and question is raised as to necessity of its presence to begin floccation of iron since sewage itself is alkaline and thus forms hydrate of iron. It is also worthy of note that iron pipes are very readily oxidized by alkaline sewage in presence of oxygen. G. H. W. LUCAS, *Can. Chem. Met.*, 6-22, 2000 w. CJW.

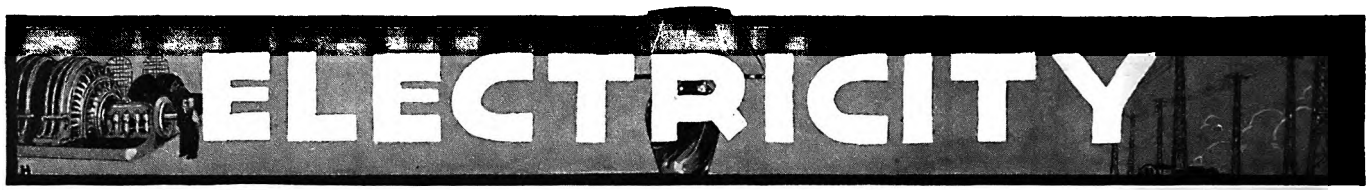
Naval Stores. Discussion of possibilities in Canada. Douglas fir very promising; 100 acres said to yield 40,000 gals. of pitch per year, each gal. of which yields ⅓ gal. of high-grade "turps." British Columbia forests are 22% Douglas fir. Since pine forests of U. S. are being rapidly depleted, present time is very opportune for investigating feasibility of developing industry in Canada. Resin licenses granted at rental of two cents per acre in addition to forest protection tax. Government also reserves royalty of ¾ cent per gal. on all resin gathered. *Canadian Dyer & Color User*, 7-22, 800 w. CJW.

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Electric Lighting Cost Going Downward

THE remarkable increase in efficiency of the electric lamp and the decreasing cost of current is strikingly illustrated in the accompanying graphs. The diagram shown in Figure 1 from *The Central Station* records the cost of light from the early days of electric lighting up to the present date.

In 1885 the best available lamp was a 16-candlepower carbon lamp, consuming about 5 watts per candle and costing $1.00. Since the cost of current averaged about 20 cents per kilowatt hour, users got only 98 lumen-hours for one cent.

Between 1885 and 1906 the following developments decreased the cost of light: (1) The cost of current decreased from 20 cents to about 11 cents per kilowatt-hour. (2) The price of the 16-candlepower carbon lamp decreased from $1.00 to 20 cents. (3) The efficiency of the lamp improved from 5 w.c.p. (2.51 lumens per watt) to 3.1 w.p.c. 4.05 l.p.w.

From 1908, until the war upset conditions, decreases in costs of lamps and energy and increases in lamp efficiency all contributed to phenomenal reductions in the cost of electric light. By the end of 1916, with an average current cost of about 8 cents per kw-hr., a price of 27 cents for the 40-watt Mazda lamp and a lamp efficiency of 9.52 lumens per watt, the consumer got 1.098 lumen hour for one cent. From 1918 to 1920 the trend of prices was upward and lamp efficiency downward, so that during 1920, with a 40-watt Mazda lamp, the consumer could get 1.045 lumen-hours for one cent.

The Central Station points out that the cost of light is now on the downward trend. Although the average cost of current is still at 1920-1921 levels, increase in lamp efficiency combined with recent decreases in the cost of lamps make it possible to obtain at the present time 1.138 lumen hours for one cent, making the cost of light with this size of lamp less than at any other time in the history of the industry.

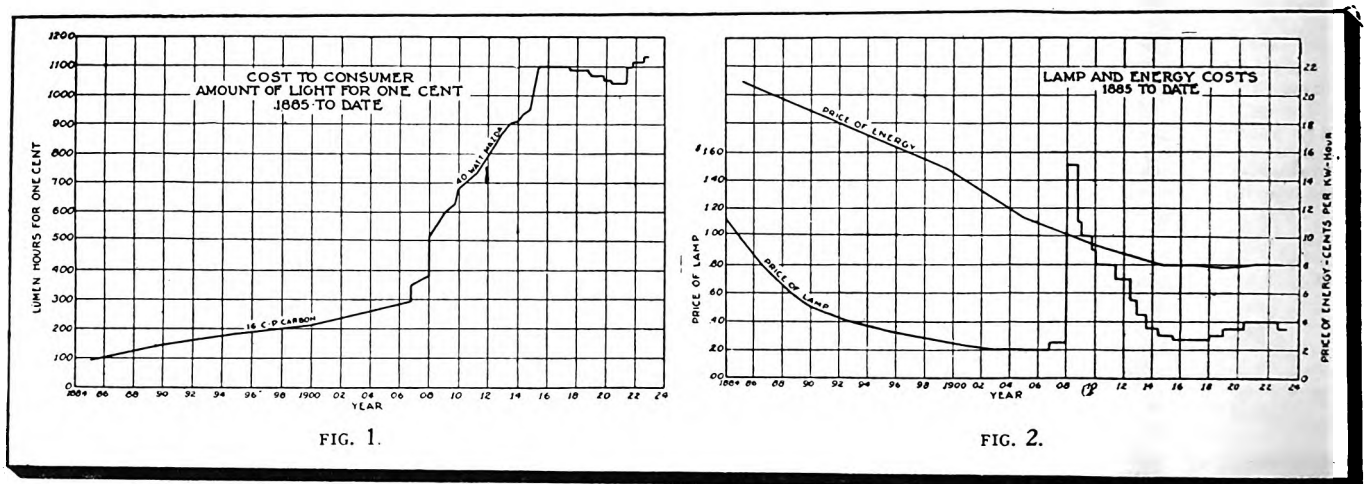


FIG. 1. FIG. 2.

Fig. 1--Graphic record of the cost of light from the early days of electric lighting. Fig. 2—Lamp and energy costs from 1885 to date.—*(Central Station.)*

Steam and Hydro-Electric Plants. Over 6,000,000 hp. of water being used today for power purposes, while over ten times that amount is being wasted. Enough waterpower available in United States to do daily work of 1,800,000,000 men or over 30 times our present population. Good proportion of waterpower lies in mountains in West. New industrial era is open for development there. Rate of increase of coal requirements, waste of fuel, etc., are also discussed. Low pressure turbines are urged to utilize steam that is now being used directly for heating purposes. After steam has produced power in the turbine, it can be utilized for the production of heat in radiators. Hydro-electric plants are urged to use low grade fuels, such as lignite coal. N. HARRISON, *Central Station*, 7-22. IG.

Power Development on Colorado River. Description of power development along Colorado River and its relation to irrigation and flood control is given. From it primary elements of general plan for river development appear to be as follows: (1) storage at headwaters for irrigation in upper section and for such power development in this section as can be accomplished without undue interference with irrigation. (2) Storage below San Juan of sufficient capacity to control floods and to regulate water available at that point for power use in middle section; (3) and storage below Virgin sufficient at least for regulation to meet irrigation requirements of lower river and for such additional flood protection as may be necessary or desirable. Adoption of this or other equitable plan will have great effect on economic progress of whole Southwest. O. C. MERRILL, *J. Am. Inst. Elec. Engrs.*, 7-22, 5,500 w. IG.

Installing the Electric Motor. Instructions for handling an electric motor from the floor of the railroad car to the plant and the proper way to install it so as to be ready for immediate operation. Improperly constructed motor bases, bases of cross channels. H. M. PHILLIPS, *Southern Engineer*, 7-22, 2500 w. MAH.

The Gennevilliers Super-Power Station of the City of Paris. A detailed description of this new generating station which will have an ultimate capacity of 320,000 kilowatts, is equipped for the preheating of combustion air, for step-by-step feed water heating with steam bled from two successive stages of the turbine, and with closed cooling circuit for the generators and other advanced features. Incidentally it is interesting to note that approximately one-third of the total number of boilers will be double-ended Sterlings with Riley underfeed stokers, and the other two-thirds will be Babcock & Wilcox single-ended with B & W stokers, all American units. *Power*, 8-1-22, 6900 w. MAH.

Modern Street Lighting Practice. Article opens with short historical description of development of electric lighting from invention of electric incandescent light in 1879. Modern street lighting had its inception in 1905 when luminous arc light was first used. Development of incandescent light into tungsten light made it possible to use these lights for illuminating streets as well. Remark-

able advances have been made in street lighting accessories, both in design and efficiency. Reflectors, refractors and globes of various shapes control distribution or diffusion in all modern lighting units. Most marked value of fixture is perhaps seen in the Novalux Highway unit, which is used for the control of light distribution. Reflecting surfaces of this fixture collect light usually wasted and direct it to road surface with maximum candlepower 17 times rating of lamp used. Importance of well-lighted streets is emphasized. A well-illuminated street is seldom dirty. Protection is basic reason for well-lighted streets. Importance of the lighting to traffic is also indicated. Five most important items in laying out street lighting system are efficiency of lighting unit and quantity of light; distribution and quality of light; day and night appearance of lighting unit; installation, operating and maintenance cost of system. Advantages of white ways are cited to be as follows: Increase of business; attraction to out-of-town buyers; psychological impression of thrift and progress created; lessens overhead wires; advances civic pride; assists fire and police departments; decreases crime; shows progressiveness of city administration; promotes other improvements; attracts industries; stabilizes real estate values; facilitates traffic; improves sanitary condition of streets; establishes new level for all lighting. A. F. DICKERSON, *Central Station*, 7-22. IG.

Grounding of Electrical Conductors for Protective Purposes. It is a well-known fact that electrical conductors are grounded when work is to be done on or near them. This author, a prominent Pacific Coast engineer, lays down the argument that all high-voltage conductors should be grounded before working on them. In this article he proves his contention. RALPH BROWN, *Power*, 8-1-22, 1550 w. MAH.

How to Build Battery Ignition Condensers Commercially. Functions of condenser are given, and things it must not do. Simple device to do the one and not do the other described. Destructive arcing at contact points eliminated. High induced secondary voltage. Condenser action in hurrying collapse of magnetic field. Materials used and their commercial forms. How these are machined and assembled. R. E. MARBURY, *Automotive Industries*, 7-27-22, 2200 w. MAH.

Reversing Switches as Used in Electric-Motor Controllers. Author tells in this article that all motor applications may be divided into reversing and non-reversing. Also tells how to reverse the direction of current in direct current motors. Connection diagrams are given to help explain this, and then a number of different types of reversing switches as used on motor controllers are described and discussed. H. A. BRIGGS, *Power*, 6-30-22, 1550 w. MAH.

Starting Equipment for Slow-Speed Direct-Connected Synchronous Motors. Because of its many advantages, this type of motor has become quite general for compressor work. The author details these advantages, and enlarges upon each of them. He presents also data of performances, curves drawn from these data, all of this being considered from a compressor standpoint rather than an electrical standpoint. THEO. SCHOU, *Power*, 8-1-22, 2340 w. MAH.

Radio Receiving Equipment. This circular describes construction and operation of home-made and inexpensive two-circuit radio receiving set employing crystal detector. Cost of materials need not exceed $15. Descriptions are meant to be so elementary and explicit that set may be constructed by persons having no previous experience with radio. Set will receive messages from high-power radio telephone stations over distance of about 75 miles and from medium-power stations over distance of about 10 miles; This set is more selective than that described in Circular 120. Bureau of Standards, Circular 121, 14 pp. 7-17-22. CJW.

Radio Information. This circular gives gives information concerning radio periodicals, radio books issued by various publishers, Government radio publications, including publications of Bureau of Standards, radio laws and regulations, and call letters and answers few of most usual elementary questions concerning radio communication which are asked by the novice. Bureau of Standards, Circular No. 122, 12 pp. 6-22-22. CJW.

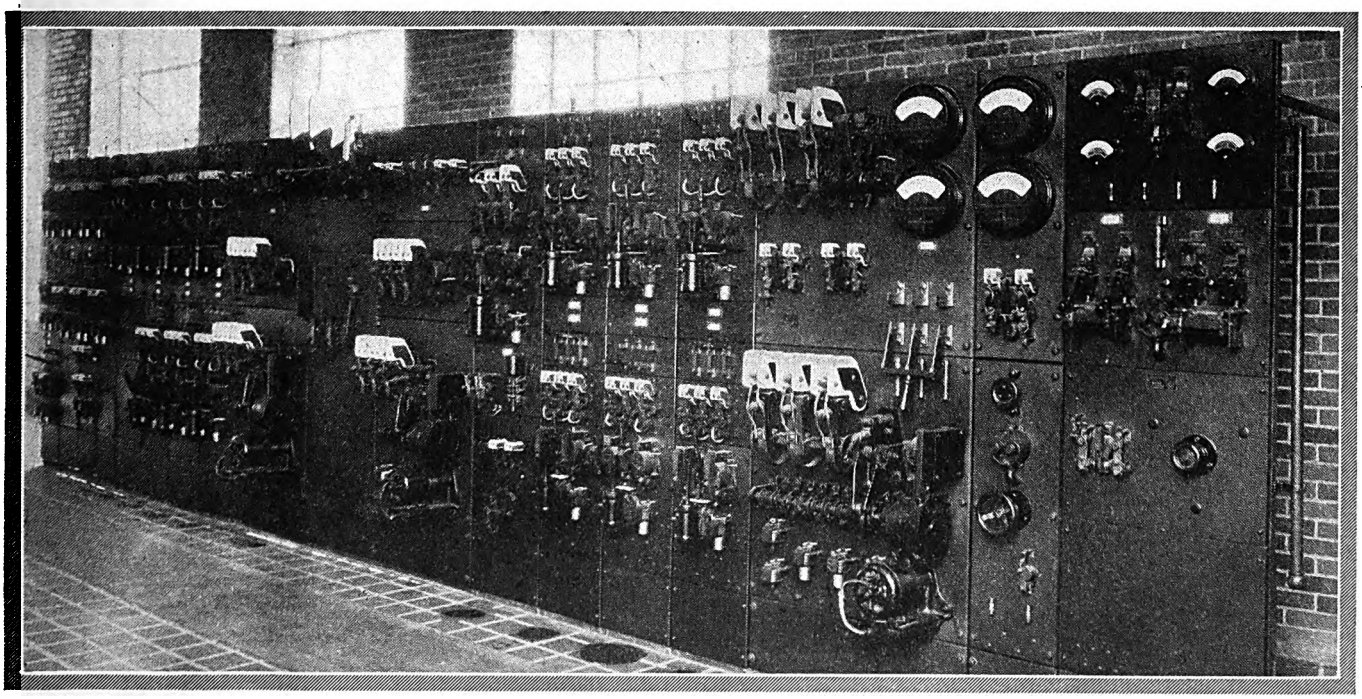
Carbon Electrodes. Third instalment, discussing calcination process. In general, due mostly to high temperatures reached in electric calcining as compared with gas-fired calciners, denser coke or calcined product will be produced in electric calciners. Advantage of gas-fired units lies in lower operating costs, aided by fact that they can use gases driven off in calcining to heat retorts, so that there will be practically no power cost. In electric calciners there is tendency to graphitize partly some of the charge and in this manner produce calcined product of lower resistivity than would be possible with gas retorts. Basis of finished electrode may be said to lie in proper calcination of materials. Without it arts of expert carbon maker are of no avail. C. L. MANTELL, *Chem. Met. Eng.*, 7-2-22, 2500 w. CJW.

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(Power Plant Engineering)

No clutches or belt shifters are needed in the modern plant served by electric power—all power requirements are handled through the switchboard.



Big Demand for Gas Appliances

NEVER before have conditions been so favorable to gas appliance manufacturers as they are today. In the first place the great amount of residential construction since the first of the year has greatly increased the market for gas appliances. And the anticipated coal shortage this winter has still further strengthened this market. *The Gas Age Record* points out that thousands of householders will delay starting up their furnaces for a month or more after the real heating season has commenced. In practically all such cases gas will be used to tide over the interval. It is believed that household heating plants will be operated on a reduced scale and that only a part of the house will be kept warm—all of which presents an opportunity for the sale of gas appliances for supplementary heating.

In cities where anthracite coal is not obtainable, soft coal or gas and coke made from soft coal will have to be used unless the manufacturers of gas appliances work overtime in an endeavor to supply the abnormal demand that is certain to develop.

Determining Pounds of Coal and B.t.u. per Kilowatt-Hour. The daily rate of fuel consumption must be figured in the majority of large and carefully run power houses. This author presents a large chart reproduced herewith, which simplifies this work, in that having the tons of coal used from the boiler room records, the heat value of the coal in B.t.u.s from the laboratory, and the output of the plant in kilowatt-hours, the consumption may be read off directly. This is done as follows: Start at the right with the k.w.-hrs. generated, follow this line across horizontally to the left until intersecting the curve for the number of tons of coal used. Then a vertical to the base will give the pounds of coal per kilowatt-hour. Going back to the same point of intersection go up or down to the diagonal indicating the B.t.u.s in the coal, then horizontally to the left for the B.t.u.s per kilowatt-hour. E. L. McDONALD, *Power*, 6-30-22, 350 w. MAH.

Pulverized Coal. Cost of pulverizing coal estimated at 78 cents for 100-ton plant and 43.5 cents for 1000-ton plant. Conditions governing successful use of pulverized fuel under boilers are: Fineness of pulverization, proper design of combustion chamber, proper air openings, damper regulation and clean tubes. Comparison of pulverized fuel and underfeed stoker per ton of coal burned showed 1.44% in favor of pulverized fuel. It offers ease of control fully equivalent to, if not exceeding, that obtainable by burning either oil or gas. ROBERT JUNE, *Paper Industry*, 8-22, 2000 w. CJW.

Spontaneous Combustion and Coal Storage. In storing coal risk of spontaneous combustion is very small. Heating of coal is believed to be surface phenomenon. Not concerned with interior of coal. Amount of heat generated will depend on exposed surface of coal, and also on temperature of piece of coal. Known that coal stored during hot months of summer and in heated regions is much more liable to spontaneous combustion than coal stored in colder climates and in cooler seasons. Another important factor is freshness of broken coal surface. Pile of coal is cooled by radiation and by movement "breathes." *American Gas J.*, 7-29-22. IG.

Storage of Coal. Spontaneous combustion of coal lies at bottom of subject of storage of coal. Relatively rare. Main interest lies in large piles needed as reserves for public service utilities and industries. Problem too complicated for simple solution. If fine coal is kept out of pile heating surface is relatively so small as to remove cause of spontaneous combustion. Temperature at time of storage is important. Spontaneous fires rarely occur after coal surfaces have been exposed for three months. Ventilation of pile should be sufficient to remove heat generated. Great hesitancy in advocating ventilating scheme for coal piles as this may make trouble in place of preventing it. Uniform sizes should be piled together in as far as possible. O. P. HOOD, Bureau of Mines, Technical Paper 311, 8 pp. 5 cents. CJW.

Distribution of Combustion Gases. Description of a remarkable method which shows the diffusion of gases in industrial heating apparatus. This is a photographic method. Model of heating apparatus is made and air is passed through the apparatus, coming in contact with strips of blotting paper which

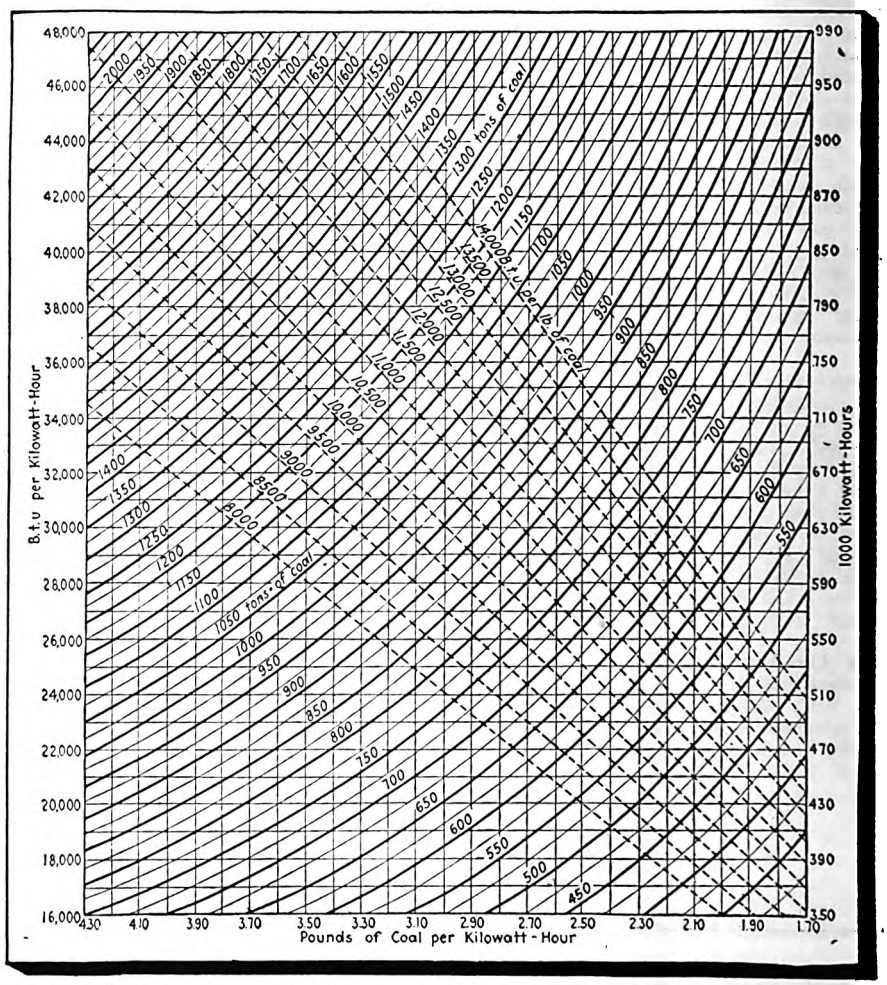


Chart for determining pounds of coal and B.t.u. per kilowatt-hour. See digest above.

are saturated with ammonia. The ammonia evaporates and is entrained with the air. Porous models of heating apparatus are soaked in solution of hydrochloric acid. Ammonia-vapor saturated air comes in contact with hydrochloric acid in models, resulting in formation of dense cloud of ammonium chloride. Quantitative method for measuring degree of diffusion of air around models is also described. In this method phosphoric acid is used in place of hydrochloric acid. Reaction takes place and ammonium phosphate is precipitated in porous paper models. Quantity of precipitate in ratio to original amount of phosphoric acid in paper gives measure of degree of diffusion of air in any particular part of apparatus. H. THOMA, *American Gas J., 7-29-22.* IG.

Natural Gas Burners. Tests of combustion products from burners using natural gas and burning in contact with utensils containing liquids at or below boiling point of water show that carbon monoxide is liberated. Quantities depend upon distance of utensil above burner, height of blue inner cone of flame, type of burner, flame characteristics and rate of consumption of gas per hour. No carbon monoxide was observed where distance of utensil from burner was such that blue inner cone of flame did not touch utensil. For given ratio of primary air to gas highest percentages of carbon monoxide are produced when utensil is placed so close to burner as to cause floating flame. Percentage increases as primary air rate is decreased. Yellow flame will produce carbon monoxide at rate greater than blue flame. Under worst conditions found, amount of carbon monoxide liberated per hour by five burners tested was not enough to be dangerous to health unless one worked directly over the burners or several burners were in use at same time for several hours, or room was unventilated. Ventilation is essential where gas is consumed. Natural gas burner will be smothered by deficiency of oxygen when oxygen content of air has been diminished to about 15.5%. Bureau of Standards, Technologic Paper No. 212 (1922), 20 pp. 10 cents.

Power Development in the Southeast. An account dealing largely with statistics on power generating stations in Alabama, Georgia, Tennessee and North and South Carolina. These generate a total, according to the author, of slightly more than a million horsepower, divided between hydro-electric and steam plants. Water reserves are listed; also quite a little space is given to present developments. CHAS. D. ADSIT, *Southern Engineer, 7-22,* 2400 w. MAH.

The Unaflow Steam Engine Industry. A marked advance in steam engine sales has been noted in recent years through the adoption, after perfection, of course, of the unaflow high efficiency type. The usual steam engine has its steam admission and exhaust ports both at the ends of the cylinder, consequently the steam travels inward during expansion and outward over the same cylinder walls during exhaust. In this latter operation, the walls are cooled off to such an extent that when steam is again admitted, much of it is immediately condensed on these cool walls. In the unaflow type, the exhaust is centrally located, with the admission ports at the ends, so that the steam travels toward the center of the cylinder during expansion, and then out of the centrally-located exhaust. The cylinder walls retain their heat from the live steam, and when steam is again admitted, there is no condensation. The article describes the engine in its various types in some detail, gives data on American conditions, production, distribution of unaflow engines by industry, etc. *Power,* 6-30-22, 2000 w. MAH.

PRIORITY	Thousands of Tons	Per cent of all coal
1. Special orders	Negligible	—
2. Public uses	208,010	33.8
3. Lake shipments	24,000	3.9
4. Domestic	103,400	16.8
5. All other	208,650	44.5
Total	616,060	100.0

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Coal production classified by priorities. Estimated distribution among the five classes of priority, established by the recent Interstate Commerce Commission order, of total normal annual production of coal in the United States.

Boiler Operation. Author proposes method that will bring complete and intelligent control of boiler operation, so far as combustion and absorption efficiency are concerned within horizon or comprehension and easy execution of average operating engineer, enabling him to determine heat losses and to separate them into several components so that he may be better able to minimize them by intelligent application of proper remedy. Proposes pound-carbon fuel unit, which is shown to be practically equicalorific, and which in B.t.u. equals 14,450 plus 62,000 times percentage of available hydrogen. Formulas are presented for calculating heat losses up chimneys and combustion and absorption losses are analyzed. Application of formulas to some scientifically conducted tests is shown. E. A. UEHLING, *Mechanical Eng., 7-22,* 3000 w. CJW.

Mechanical Draft. May be produced by any one of three distinct systems: vacuum or induced draft, forced draft, balanced draft. Advantages of induced draft over forced draft are very pronounced. Can be used with all kinds of fuels and is adapted to ordinary grates, rocking grate bars, chain grates and other types of furnace except those in which underfeed stokers and hollow blast grates are used, where forced draft should be used. Turbo blowers are least expensive of all kinds of mechanical drafts to install and are easy of regulation. Balanced draft, with slow movement of gas, is giving most gratifying results by enabling increased evaporation per pound of coal, in some cases permitting use of lower grade of coal and giving lower depreciation and lower maintenance charges. ROBERT JUNE, *Gas Age-Record, 7-1-22, Paper Industry,* 6-22, 1800 w. CJW.

Recent Developments in Warm Air Heating. Summation of salient points in research work on furnaces, which has been conducted by the University of Illinois, through National Warm Air Heating and Ventilating Association. Semi-annual reports have been published in bulletin form, this article summarizing the last half year, the bulletin for which is not yet out, but referring in addition to earlier work. The valuable data now available permits calculating the size and performance of a hot air furnace with the same accuracy as a steam or hot water boiler can be determined. Rules are given for figuring some of the usual air ducts. F. R. STILL, *Warm Air Heating & Sheet Metal J., 6-22,* 5900 w. MAH.

Exhaust Steam for Heating. Principal factors influencing amount of exhaust steam used for heating are: Total amount available, total amount of steam required for heating, duration of heating season, and monthly and hourly distribution of steam. Results of various actual cases shown in curves. Amount of steam used for heating varies with volume, total exposed surface and radiator surface. Curves are given showing relation between each of these three factors and the tons of coal per year required for heating. *Heating and Ventilating Mag., 7-22,* 1000 w., 20 curves. CJW.

Heat Losses from Pipe at Temperatures up to 800° F. High temperature superheated steam and high temperature chemical processes are in such wide use today that temperatures of this kind must be given serious thought by all operating engineers. With special reference to pipe radiation losses, the author discusses bare and covered wrought iron pipe. He gives charts showing the losses under certain conditions. R. H. HEILMANN, *Southern Engineer, 7-22,* 1750 w. MAH.

Refrigeration Lecture Course. This is the ninth in this series, and takes up automatic refrigeration and safety operation. An outline of a completely automatic system is given, thermostats as used therein are shown, the various pressure control valves are described. Then a semi-automatic system is described in detail. H. J. MACINTYRE, *Southern Engineer, 7-22,* 2100 w. MAH.

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Scarcity of Steel Predicted

THE *Iron Age* points out that a rationing of the steel supply may be necessary for the remainder of the year as a result of the coal and railroad strikes. Although no large steel plants have closed down, operations have been greatly curtailed. The industry is reported to be working at 50 to 60% capacity as compared with 75% six weeks ago. Price advances and other evidences of a scarcity market have developed. For example, wrought iron pipe, plain and galvanized, has been marked up $10 per ton, the first change since September 1, 1921. Other noteworthy advances have taken place in the price of nails, wire, sheet bars, pipe. Warehouse prices have also increased in response to the piecing out demand that is coming from all directions.

In the further advance in pig iron prices, foundry grades have taken the lead and in nearly all important centers have been marked up from $1 to $3 a ton.

Another factor that will operate to keep prices at a high level is the advance in wages of steel mill labor. It is pointed out that the wage increase will prevent prices from coming down very far from the present high prices of steel and not for a long time, if ever, will bars, shapes and plates reach the low level of 1.35 per pound prevailing in March.

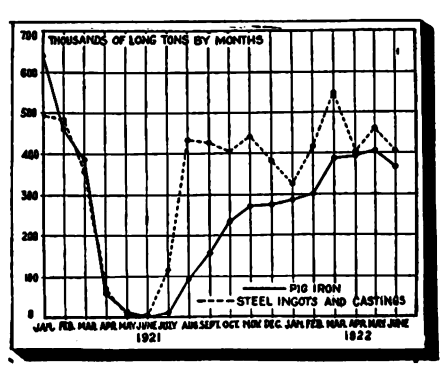
Cast Iron Water Pipe Made by de Lavaud Process. In this process, the melted metal is poured into a revolving mold and deposited by the centrifugal force of rotation against the outside wall of the mold. This permits continuous casting of a pipe without the use of cores. It is said to make a dense grained homogeneous casting with a slight surface chill due to the contact with the water-cooled rotating cylinder. Machines are now available for casting the 4-, 6- and 8-inch sizes, but the machines for larger sizes are being perfected and consequently these larger sizes are molded in sand. The article illustrates and describes the pipe, the method of molding from melting to finished pipe, and gives constituents of machine made pipe as compared with sand mold pipe. *Canadian Foundryman*, 6-22, 2900 w. MAH.

Properties of Chilled Iron Car Wheels. The chilled wheel is simply a cast iron wheel, which has had a chill inserted in the mold so as to chill the metal of the tread or the ring portion first and most quickly. This has the effect of making that portion of the metal more dense, and thus it wears much longer. The article describes the method of molding such wheels, how they are tested, what the tests at the University of Illinois showed, draws conclusions from the test results, and gives the author's own deductions from these conclusions. He gives also the results of the Bureau of Standards tests, tells how they were made, and the conclusions which could be drawn from them. *Electric Traction*, GEORGE W. LYNDON, 7-22, 4100 w. MAH.

Story of Steel. One of a series of articles on the origin, manufacturing history and uses of basic building materials. Very popular and readable article with a list of references consulted. The early history, both conjectural and verified, is given; the various iron minerals are discussed. Methods of mining and transporting the ore to the smelter. The blast furnace and pig iron production. The bessemer and open hearth steel processes. The manufacture of metal lath, steel sash and other construction materials. Uses of cast iron and the manufacture of castings. Manufacture of wrought iron and crucible steel. Electrical steel. F. L. BURCH, *Building Materials*, 7-22, 3500 w, 9 figures. APS.

Manufacture of Light Steel Castings. General discussion covering practical experiences in a jobbing steel foundry where castings are made in the rough from a few ounces to 14 tons. Plan of the foundry, making of castings, running and feeding, other topics. H. BRADLEY, *Blast Furnace & Steel Plant*, 7-22, 2150 w. MAH.

Alloy Steels. Production of small heats of alloy steels on an experimental scale is often desirable in beginning study of new alloy steels before large amounts of expensive alloys are used in heats of commercial size. Small electric furnaces offer some advantages over crucible furnaces for experimental work, and various types of such furnaces are being successfully used by different firms for such work. Preparation of ingots described. Points regarding preparation of steels, particularly as to recovery of alloying elements from various ferro-alloys entering steels, are of interest. Indirect-arc furnace finally used seems also to be sufficiently useful piece of experimental apparatus to justify its description. Detailed information regarding tests made with uranium, silicon, manganese, chromium, molybdenum, vanadium, nickel, copper-nickel, aluminum, zirconium, cerium and boron as alloying agents are given. H. W. GILLETT, Bureau of Mines, Bulletin No. 199 (1922). CJW.



Production of steel and pig iron in Great Britain, by months, to June, 1922.— *(U. S. Commerce Reports.)*

British Open-Hearth Furnace Practice. Abstract of paper by Fred Clements before Iron and Steel Institute (British). He proposes a new furnace of 100 tons capacity and aims at higher temperatures and more rapid working in order to cut costs by reduction of heat losses. Details of this furnace are given together with diagrams. Discussion of regeneration, protection of refractories from hot gases, the binding of furnace and regenerators. Extremely important paper with valuable discussion. A separate session of the Institute for further discussion of this paper was proposed. *Iron Age*, 7-13-22, 3000 w. APS.

Centrifugal Casting. A resumé of the development and a discussion of the design and operating problems of centrifugal-casting processes and their field of application. The centrifugal casting of hollow metal objects. Deals with the field of centrifugal casting and history of development of the art and discusses the mechanics of the problem and describes the operation of the casting machine. Then author takes up the thermal conditions in the mold with a discussion of the manufacture of plates by the centrifugal-casting process. LEON CAMMEN, *Mechanical Engineering*, 8-22, 5000 w. APS.

Significance of Impact Test. Typical test data on certain alloy steels and ordnance steels are recorded. Comparison of static and dynamic tests. The properties revealed by the impact test and the possibilities of interpreting results of the test in engineering practice. C. F. LANGENBERG and N. RICHARDSON, *Forging & Heat Treating*, 7-22, 5000 w. APS.

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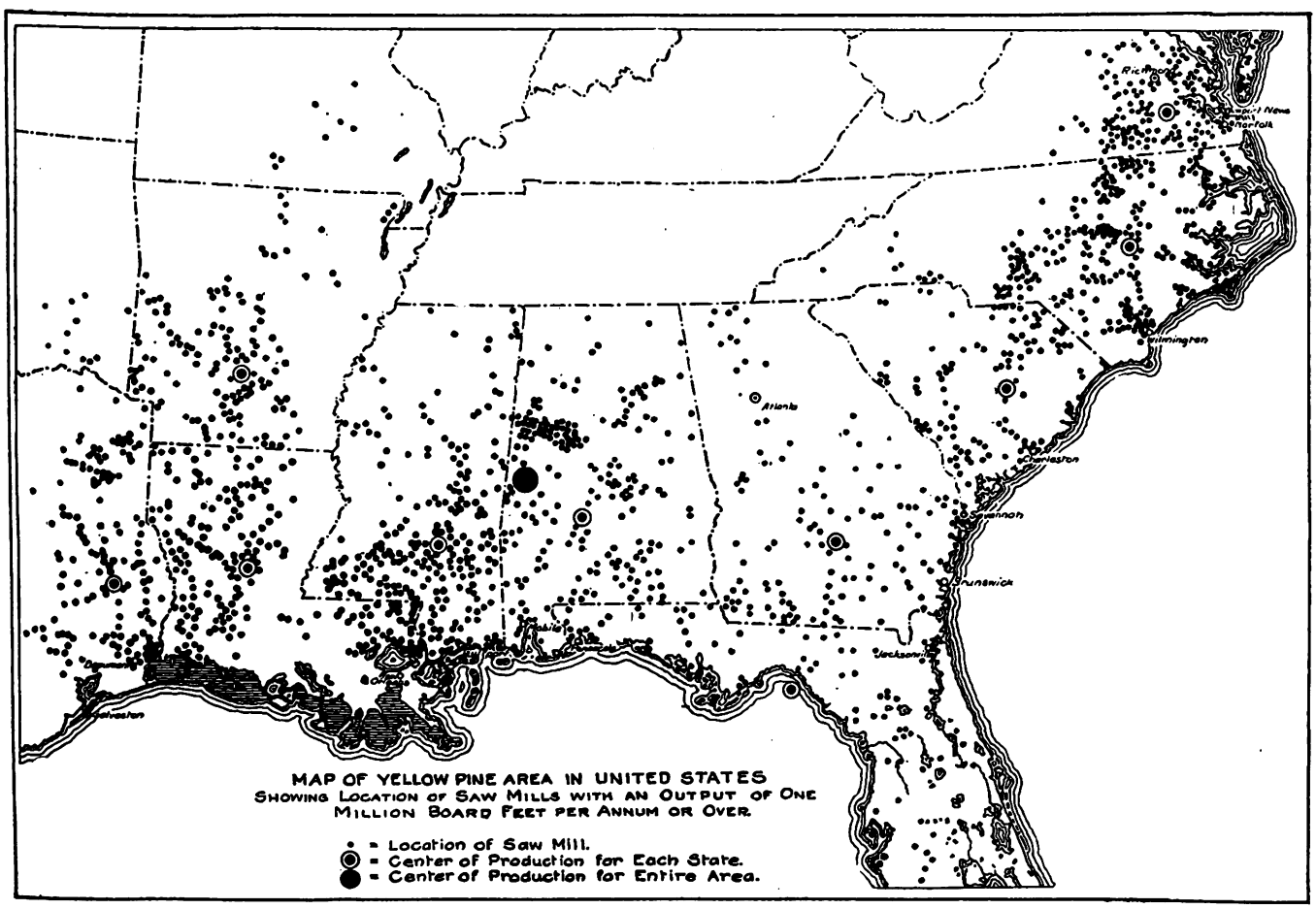
Danger of "Skyrocketing" Prices

WHILE there has been some slight reduction in the volume of orders for lumber as the result of the railway shopmen's strike, in most cases the strike has resulted in an increased demand. According to *Lumber,* manufacturers are cautious in their acceptance of business. Many have withdrawn from the market temporarily, and others are limiting their offerings to "specials" that they are in a position to ship, subject to car supply. The car shortage in the Southern lumber districts is growing more acute daily and many orders are being declined. Stocks are badly broken and are much below normal. There is said to be an active demand from retail yards, while the call for railroad materials and other special cutting is heavy. The hardwood demand is also reported to be active. Production is being increased, but stocks that are in shipping condition are low. Furniture and automobile factories are the largest buyers of hardwood; box and crate factories are also taking large quantities of the material.

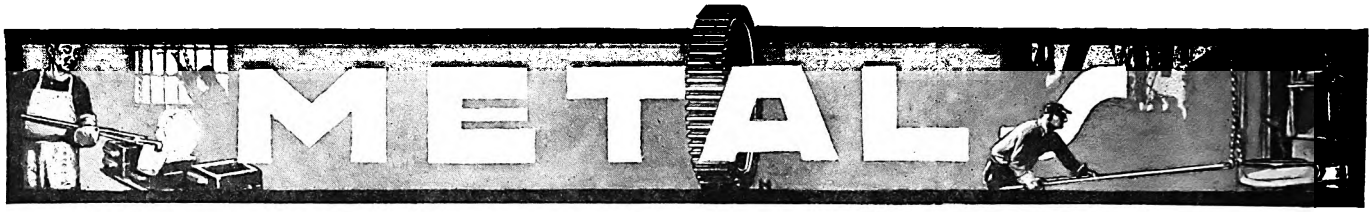
Discussing the menace of the car shortage, the *American Lumberman* advises that buying should be confined to immediate needs wherever possible and that every effort should be made to avoid a runaway market. "Whatever happens in the transportation situation," says this publication, "it is to be hoped that lumber buyers, and sellers, too, for that matter, will 'keep their heads' and avoid methods that can do no good but that may kill demand and demoralize business generally by skyrocketing prices."

Fire Tests of Loaded Columns. Fire endurance classification of nominally 12 by 12-in. selected structural long-leaf Southern pine or Douglas fir column of ordinary length may be more than doubled if ends are adequately protected against fire. Steel caps as ordinarily used should be insulated or concrete cap should be used, preventing crushing and grooming of wood fibers under cap. Consideration of results would suggest that adequate insulation for ends of timber columns may be obtained from insulation of fireproof materials on exposed faces of standard steel or cast-iron post caps. Other methods of insulating metal caps have so far not been successful for it has been determined that interposing insulating materials of various kinds and thickness between metal post caps and ends of timber columns does not prevent failure of columns by local end crushing, when loaded and exposed to fire. Mechanical difficulties of so insulating standard metal cap as to achieve required results should involve no great difficulty. T. F. LAIRT, *Eng. World,* 7-22, 1200 w. CJW.

Preservative Treatment of Poles. How fungi grow in wooden poles and cause their decay. Food supply, on which fungi subsist, must be destroyed by the impregnation of the pole with chemicals, which are poisonous to the fungi, but which do not injure the wood itself. Removal of air and moisture is also essential. P. M. MCCULLOUGH, *Telephony,* 7-8-22. IG



Map of yellow pine area in United States.—*(Chemical Age.)*



Metal Prices Holding Firm

THERE have been no unusual developments in the metal markets; prices have remained firm, and the outlook for copper, lead and zinc is encouraging. The orders for drawn, rolled and cast copper and brass products have been satisfactory. Although much of the development work undertaken in the spring was completed a month or two ago, fair supplementary orders have been coming in and there has been some buying to replenish stocks. One feature of particular interest, according to the *Steel & Metal Digest,* is the gradual disappearance of heavy stocks of scrap copper, most of which was accumulated during the war. The *Financial Age* states that, with current demand for copper running some 10,000,000 pounds per week in excess of production, it is estimated that the present stocks of about 300,000,000 pounds will soon be exhausted and force the market to rely solely upon production.

Jobbers throughout the country are said to be low in stocks of finished goods and anxious to book more business than the mills care to take under present unsettled conditions.

Lead is also reported to be in a strong position. *The Northwest Mining Truth* points out that, contrary to predictions, the price of lead holds firm at $5.75 per hundred pounds. Although domestic demand does not appear to have increased as expected, it is believed to be about equal to production.

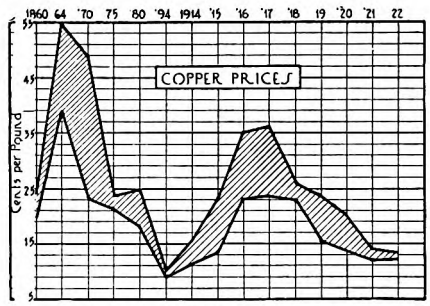
It is also believed that the surplus stocks of zinc, which at one time were very heavy, have been greatly reduced. Although the demand for zinc has declined slightly, the *Engineering and Mining Journal* points out that this is undoubtedly due to the coal strike.

Development of the Metals after Stone Age. Axe is used as a basis, author tracing development of early copper, and subsequent bronze axes from the earliest stone cutting tools. This is the first part of an article which aims to show the whole development from earliest days down to date. F. H. BELL, *Canadian Foundryman,* 6-22, 1150 w. MAH.

Toughness and Hardness of Metals. Ordinary tests do not show wearing qualities of metal. Scleroscope and other hardness tests, the Fremont, Charpy and Izod impact tests are discussed. Wear test machines are very slow in making tests and destroy the piece tested. It is desirable to have a machine which will give a wearing quality test in a simple manner like the hardness and impact tests. E. F. LAKE, *Forging and Heat Treating,* 7-22, 3000 w. APS.

Zinc Industry. Zinc smelters in 1921 suffered disastrous year, operating at greatly reduced capacity and probably loss in operations. Total capacity for country is about 1,300,000 tons, corresponding to about 1,100,000 calcined ore. Production of zinc oxide directly from ore was affected adversely by industrial depression. One of greatest rooms for improvement in metallurgy of zinc is in blende roasting. In distillation practice attention may be given to matter of reducing quantity of between products to be resmelted. Art of electrolytic zinc extraction made great headway during 1921, especially in direction of improving yield of zinc. W. R. INGALLS, *Mining and Metallurgy,* 7-22, 1500 w. CJW.

Old and New Processes of Using Zinc. Zinc used as a protective coating for iron and steel in the processes of galvanizing, hot and cold and zinc dust methods, sherardizing and painting methods with their various advantages. THOMAS NEWTON, *Sheet Metal Worker,* 7-7-22, 1800 w. APS.



Range of copper prices, 1860-1922.— *(Magazine of Wall Street.)*

Metallurgy of Solders. Nature of solders and properties required such as easy fusibility, good strength, proper hardness. Analyses of solders, photomicrographs of soldered joints. Autogenous soldering or welding. Borax and the numerous substitutes for borax. Very complete and informative article. WALLACE DENT WILLIAMS, *Raw Material,* 7-22, 7200 w. APS.

Drawing Chromel Wire. This metal is a high-grade alloy containing 80% nickel and 20% chromium, in its best grade. It is very hard, difficult to draw, is immune to oxidation and corrosion at temperatures up to 2200 F., and has an electrical resistance 50 to 65 times greater than that of copper. It is used very largely as a heating element in electrically heated devices of all kinds. The article describes the methods of drawing the wire, its uses and physical properties. the manufacture of the dies, which are of the diamond type, the machinery used, the rolling of ribbon stock, and other related topics. E. F. LAKE, *Machinery,* 6-22, 3450 w. MAH.

Brass Melting Furnace. Description of construction of brass melting furnace. Natural draft coke-fired furnace. Details of operation. 2 diagrams. CHARLES VICKERS, *Brass World,* 6-22, 2200 w. APS.

Cores and Core-making Practice Good and Bad. Author points out that there are many chances for discussion between cores and green sand on the one hand, and the method of making the cores on the other, and that a good foundryman must exercise considerable judgment in making his choice. Often cores are used where green sand would be just as good and less expensive. He points out a number of cases in which this was the case, illustrating the piece and in those cases in which cores were used, the core box as well. A. SKINNER, *Canadian Foundryman,* 6-22, 1350 w. MAH.

Thermit Welding. Thermit welding is indicated in all heavy welding operations. Million of pounds of thermit used each year in welding operations. Used in over 95% of railroad shops. Thing of greatest importance in thermit welding is selection of proper molding material. Differs from that used in ordinary steel foundry practice because it must withstand 5000° F. Specimens usually break outside welds, not along line of fusion, but really remote from weld. Field hardly overlaps that of electric arc or oxy-acetylene welding. J. H. DEPPELER, *J. Am. Welding Soc.,* 6-22, 1500 w. CJW.

Compressed Air in the Foundry. Air is now used in foundries for many purposes, such as hoists, sand shakers, vibrators, rammers, squeezers, chipping hammers, core busters, stationary air motors, grinders, etc. In this article, the author describes these and points out the advantages of the pneumatic over other forms. He gives some attention also to the care of pneumatic equipment. Ways in which pneumatic devices reduce costs and increase production. L. W. SCHNITZLER, *Compressed Air Magazine,* 7-22, 4000 w. MAH.

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MACHINERY

Fuel Shortage Threatens Machine Demand

THE fact that August sales of machine tools are not up to the July record is attributed by the *Iron Age* to the uncertain conditions growing out of the coal miners' and railroad shop mechanics' strike. Railroads which have recently made known their machine-tool requirements are taking no action and are not expected to do so until their labor troubles are over. There has been some buying by a few roads, but the large lists of the New York Central, Illinois Central and other roads are dormant. Industrial companies are also losing interest in new equipment as fuel shortage threatens their operations.

Another effect of the strikes has been to increase the cost of manufacture. The fact that pig iron, steel and labor costs are all on the upturn makes any further reductions in the price of tools out of the question, and it is believed advances will take place in the fall.

But in spite of these disturbances never before in the history of the industry has there been a greater effort to make machine tools that will aid in reducing production costs.

The American Machinist points out that the effort to make better machine tools has resulted in the manufacture of heavier and stronger machines. In some cases the machines even surpass in excellence the tools which originally inspired their manufacture.

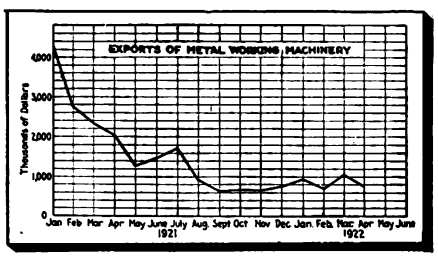
Efficiency of Machine Cutting. Author refers to acetylene cutting machines, in which acetylene torch is used for the cutting, while the mechanism guides this along a predetermined path. He claims that cutting with the oxy-acetylene torch can be made to approach very closely to the maximum theoretical efficiency, and proves his points by giving details of some unusual jobs on the top and bottom plates for gun carriages on steel billets, and especially the cutting of circles, squares, ovals and similar regular shapes. FRED J. MAEURER, *Acetylene J.*, 6-22, 6700 w. MAH.

Cutting Costs with Power Riveting Hammers. Several examples of cold riveting and rivet cutting operations in the shop of the High Speed Hammer Co., Rochester, including cold riveting of forged steel hub caps to axle shafts, riveting steel studs, riveting chain links, riveting automobile top frames and brake bands, and others. FRED R. DANIELS, *Can. Machinery*, 6-22, 2900 w. MAH.

Die Design and Die Sinking. Part IV. Distribution of metal. To produce a forging of widely varying cross section the bar stock is drawn, the mass zones are located in the "edger" impressions, it is rough blanked and finally drop forged into the desired form and trimmed. J. H. G. WILLIAMS, *Forging & Heat Treating*, 7-22, 2000 w. APS.

Carborundum. The discovery of the product and its commercial introduction. Method of manufacture and properties of carborundum. Uses as abrasive and refractory. *Raw Material*, 7-22, 1800 w. APS.

A-B-C of Sheet Metal Working Machinery Application. Crimping machines of various types, their uses and suggestions or selecting suitable equipment for the service desired. L. BROEMEL, *Sheet Metal Worker*, 7-7-22, 1500 w. APS.



Total value of all metal working machinery exported from the United States, based on returns compiled by Bureau of Foreign and Domestic Commerce. — *(American Machinist.)*

Sand Pumps. One of the large fields, as the author says, for centrifugal pumps, is their use in pumping sand, as in dredging and hydraulic mining. He describes the pumps used in this work, the desirable way of arranging suction pipes, discusses forms of impellers, gives data from tests of centrifugal pumps in this work, etc. E. T. KEENAN, *Southern Engineer*, 7-22, 3000 w. MAH.

Naval Gun Factory at Washington. This factory is equipped to manufacture guns up to 20-inch diameter of bore and 50 calibers in length, a size much larger than has ever been built anywhere. It is equipped to manufacture guns, mounts, sights, breech mechanisms, torpedo tubes, torpedoes, gun-firing, lighting and fire-control instruments. Story of what the plant can do and has done. 16-inch guns have been turned out here. Production department diagram and photographs of the immense tools in operation. SIDNEY G. KOON, *Iron Age*, 7-13-22, 2500 w. APS.

Maintenance of Textile Machinery. Author takes up statement of well-known engineering appraiser that there is no known rule for setting a value on textile machinery which will apply to all cases. From this he points out the reasons why this is so, and shows those owners who have had their equipment placed in the lower classes why this is so. Among the important points are leveling the machines at the start, and keeping them level as long as they are in use. Bearings must be snug but not tight, free but not loose. Driving belts must run true, loose enough, well lubricated. Motors must be properly mounted, leveled, lubricated, regularly inspected, wiring must be neat, free from oil- or water-soaked wires, etc. Owners and users of machinery should follow manufacturers' instructions as to care and operation, and the latter should furnish charts on the order of automobile charts which tell how often to lubricate and inspect each of the different parts. EDWIN H. MARBLE, *Cotton Mill News*, 5-18-22, 2900 w. MAH.

Material Handling Equipment Used in Iron and Steel Industry. The handling machinery and apparatus used in the manufacture of steel. From the time that the ore leaves the mines until the steel goes through the last process at the mill it is moved about exclusively by various types of heavy machinery designed especially for the purpose. Ore vessels and unloading equipment, ore-cars, car dumpers, ore bridges, skip cars, slag cars, ladles and ladle cars, charging boxes, molds and mold cars, ingot strippers, roller tables, distributing systems and other means of handling, conveying and manipulating the material at all stages of the process. F. L. LEACH, *Mechanical Engineering*, 8-22, 14 figs. 6000 w. APS.

How Hot Does a Bearing Run? Temperature of bearings is highly important, for bearing metals generally have low melting points. Author points out that temperatures in a bearing vary from point to point and no exact rule may be laid down. Thermocouple is only instrument which will give any degree of accuracy in bearing temperature measurements because of this, although temperature of oil before and after passing over the bearing may be measured closely. Other interesting facts for user of much machinery with many bearings. W. F. OSBORNE, *Power*, 6-30-22, 1400 w. MAH.

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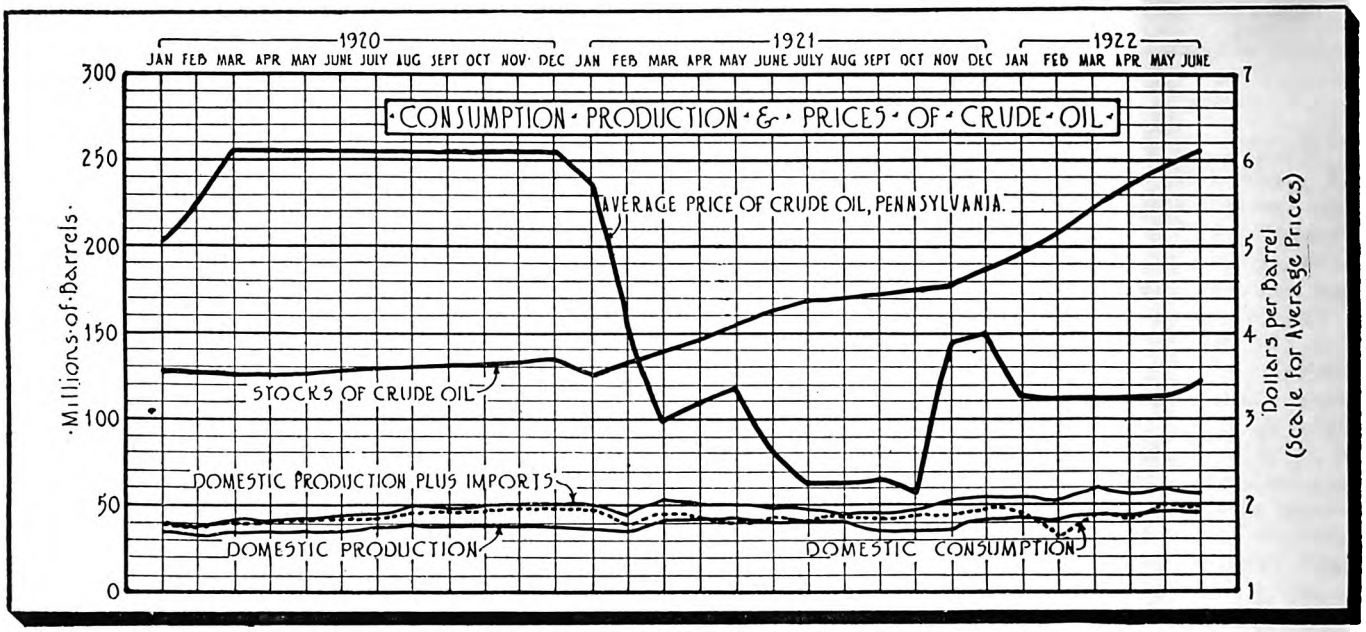
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Gasoline Prices Investigated

ACCORDING to figures compiled by H. J. Lowe, petroleum economist of the Bureau of Mines, gasoline reserve stocks in the United States are the largest in the history of the country and are growing at a much faster rate than domestic consumption. The present stocks, on which figures were compiled at the end of the first quarter of 1922, were 854,232,000 gallons, which was greater by 20% than for the first quarter of 1920. Consumption has increased, but only 7% more was used in the first quarter of 1922 than for the first quarter of 1920. In spite of the increasing number of cars, it is pointed out that the stocks of gasoline are increasing still more rapidly. As a result of recent price advances, an investigation is being conducted by the Senate Committee on Manufacturers which, according to *Motorcycle and Bicycle*, will seek to determine: Whether there exists unfair competition or monopoly; whether fluctuations in exports and imports have had a material effect on domestic prices; whether increased transportation costs, including installation of new pipe lines, caused the recent "sky rocketing"; present supply of gasoline and crude oil, and daily production of gasoline; present rate of consumption, which producers claim has increased enormously the past few weeks; whether shortage of coal has, by creating new demands for fuel oil, had any effect in price boosting.



Consumption, production and prices of crude oil in the U. S. during 1920, 1921 and first half of 1922.—*(Magazine of Wall Street.)*

Diamond Drilling for Petroleum. Diamond drilling in oil industry has passed experimental stage and cable and rotary drills are likely to find in this drill competitor of importance. Four points of interest in its use: Prospecting structures, deepening old wells and partly completed wells, wildcat drilling and production drilling. Mechanically, diamond drilling is merely development of rotary process. Bit is hollow cylinder of soft steel, into one end of which diamonds may be set. Stones are of black opaque, non-crystalline variety, known as carbons, are secured from Brazil and are valued at $125 per carat. Setting very important. Run of 400 ft. before resetting is not uncommon in soft shale, sandstones, etc., and loss of value to bit will average $50-60. Recovery of core is accomplished by core barrel. Water cooling necessary. Handles 30 to 40 ft. core. Not practicable, from standpoint of cost, to make hole larger than 6 in. Fishing job completed in seven hours. Production value is yet to be determined. ERNEST R. LILLEY, *Eng. Min. J.-Press*, 7-22-22, 3000 w. CJW.

Sulfur in Petroleum. In general, mineral lubricating oils which contain large percentages of sulfur compounds are more easily oxidized than those in which there is less sulfur. This is true whether the oils are heated to 250° or exposed to sunlight. Residues left behind on cracking and partly distilling off oils, as in Conradson carbon residue test, tend to retain sulfur in oil. Bearing of these facts upon formation of sludge in transformer and turbine oils, and of carbon in internal combustion motors, is pointed out. C. E. WATERS, *J. Ind. Eng. Chem.*, 8-22, 2500 w. CJW.

New Process of Distilling Tar. Description of a new process and apparatus for the distillation of tar, which can be used in the average sized gas plant successfully and economically. Process consists of fractional condensation instead of fractional distillation. Good results have been obtained with it in France. C. AB-DER HALDEN, *American Gas J.*, 7-8-22. IG.

A by-product from the manufacture of oil gas in Germany has been found to be an effective binder for fuel briquets made from coke dust.—*Steam Shovel & Dredge Mag.*

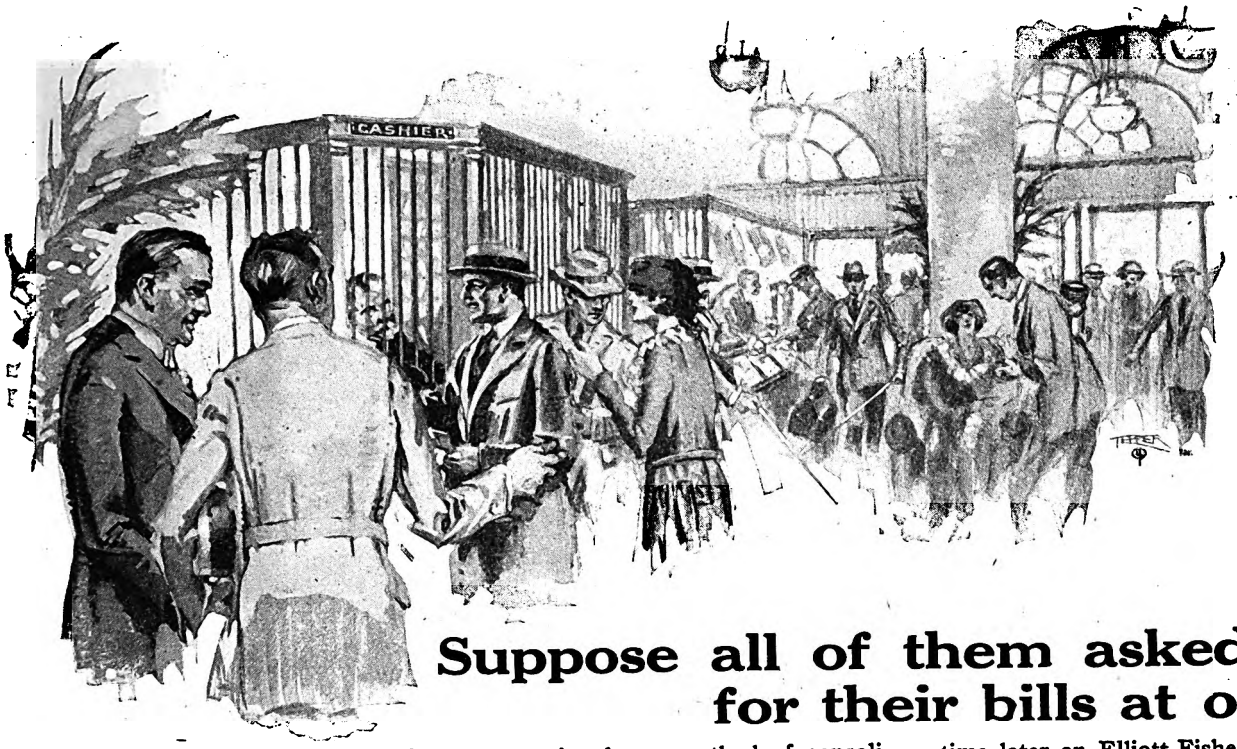
Fractional Distillations of Fuels and How to Make Them. Present apparatus said to make consistently comparable results impossible. Desirable characteristics of satisfactory apparatus described and use developed. New type of still described which fulfills all the requirements. Data on fractional distillation. What fractional distillation will tell. P. S. TICE, *Automotive Industries*, 7-29-22, 7600 w. MAH.

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Suppose all of them asked for their bills at once!

GUESTS enter and leave this gigantic New York hotel like ants swarming an ant hill. I couldn't understand how the bookkeepers had every account ready at a minute's notice.

The cashier answered my question by giving me a look at his bookkeeping department. "Our system here," he said, "is so complete, fast, and accurate that not so much as a ten-cent phone call escapes notice or is charged to the wrong person. We handle 2,200 accounts a day, and sometimes a daily average of 3 items per account."

I wasn't satisfied—"But how can any system keep track of this host of constantly changing records?—You can never tell what guest is going to want his bill or when he is going to want it."

"We are ready for all of them at any time, *all* the time."

He pointed to a row of Elliott-Fisher Accounting and Writing Machines.

"These machines are kept busy day and night. Elliott-Fisher is the only machine which can do the job in the way we must have it done at a cost we can afford. The handling of guest cards and city accounting on Elliott-Fishers makes our ready-on-the-minute system possible.

"They enable us to have also a Daily Financial Statement for the management; and in addition to that a correct daily record of activities by departments — payables and receivables."

I found out a lot about Elliott-Fisher in that talk. These machines can serve any firm, however numerous the customers and complicated the accounts, as well as they serve this great hotel. It isn't a new system of accounting but a method of consolidating, speeding up, intensifying the accuracy of the records you have. Over 15,000 firms in the United States representing more than 400 different lines of business use Elliott-Fisher machines.

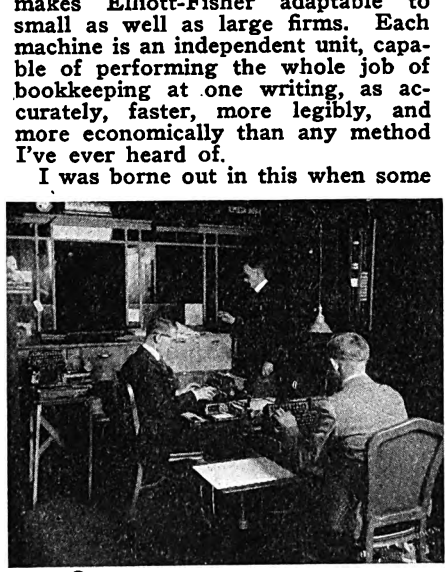
"Quantity production together with economy cannot be achieved," declared the cashier, "except by standardization and simplification of work. This is quite as true of accounting and bookkeeping as it is of making automobiles. Elliott-Fisher performs the essentials of bookkeeping in *one simultaneous operation*. No other machine in the world can do it because Elliott-Fisher alone works upon the flat-writing surface principle, which makes it possible to write as many as 16 forms, different sizes and shapes, i.e., bills, statements, ledger sheets, distribution-analysis sheets, etc., *all at one writing*."

Any business man could see at once that this single operation feature also makes Elliott-Fisher adaptable to small as well as large firms. Each machine is an independent unit, capable of performing the whole job of bookkeeping at one writing, as accurately, faster, more legibly, and more economically than any method I've ever heard of.

I was borne out in this when some time later an Elliott-Fisher salesman gave me the whole story. "All the advantages," he said, "of getting bills out every day, posting up to the minute, statements out on the first of the month, and balance regularly on the first, including the last day's business of the past month, belong to the Elliott-Fisher user." Elliott-Fisher alone can meet this test of an ideal accounting machine:—

1. It gives a complete record (written description as well as figures) of each transaction. Without both no record is really complete or understandable.
2. It saves the maximum of time and labor by making the greatest number of records or the greatest number of legible copies of one record at one writing. The invoice, the bill of lading, the statement, the ledger record, the analysis of sales or purchases, or any other record or combination of records, can be made at one operation on the flat writing surface, an exclusive Elliott-Fisher feature.
3. It establishes mechanical proof of accuracy by means of the visual audit sheet, which automatically proves each entry as it is written.

In return for an hour of your chief accountant's time, the Elliott-Fisher representative will analyze your accounting methods and make a written report to you of how much money Elliott-Fisher can save you.



Elliot-Fisher Machines at work on guest cards and city accounts

Elliott-Fisher

Accounting and Writing Machines: Flat Writing Surface

ELLIOTT-FISHER COMPANY

General Sales Manager's Office
342 Madison Ave., at 43rd St., New York, N. Y.
Branches in all large cities



Newsprint Waste to Result in Higher Prices

UNLESS there is an immediate retrenchment in newsprint consumption it is predicted that price increases and an artificial shortage will be encountered early in the fall. Although warned by the American Newspaper Publishers' Association that extravagant use of newsprint this year would exact a penalty of higher prices, few newspapers made any change in their publishing policy.

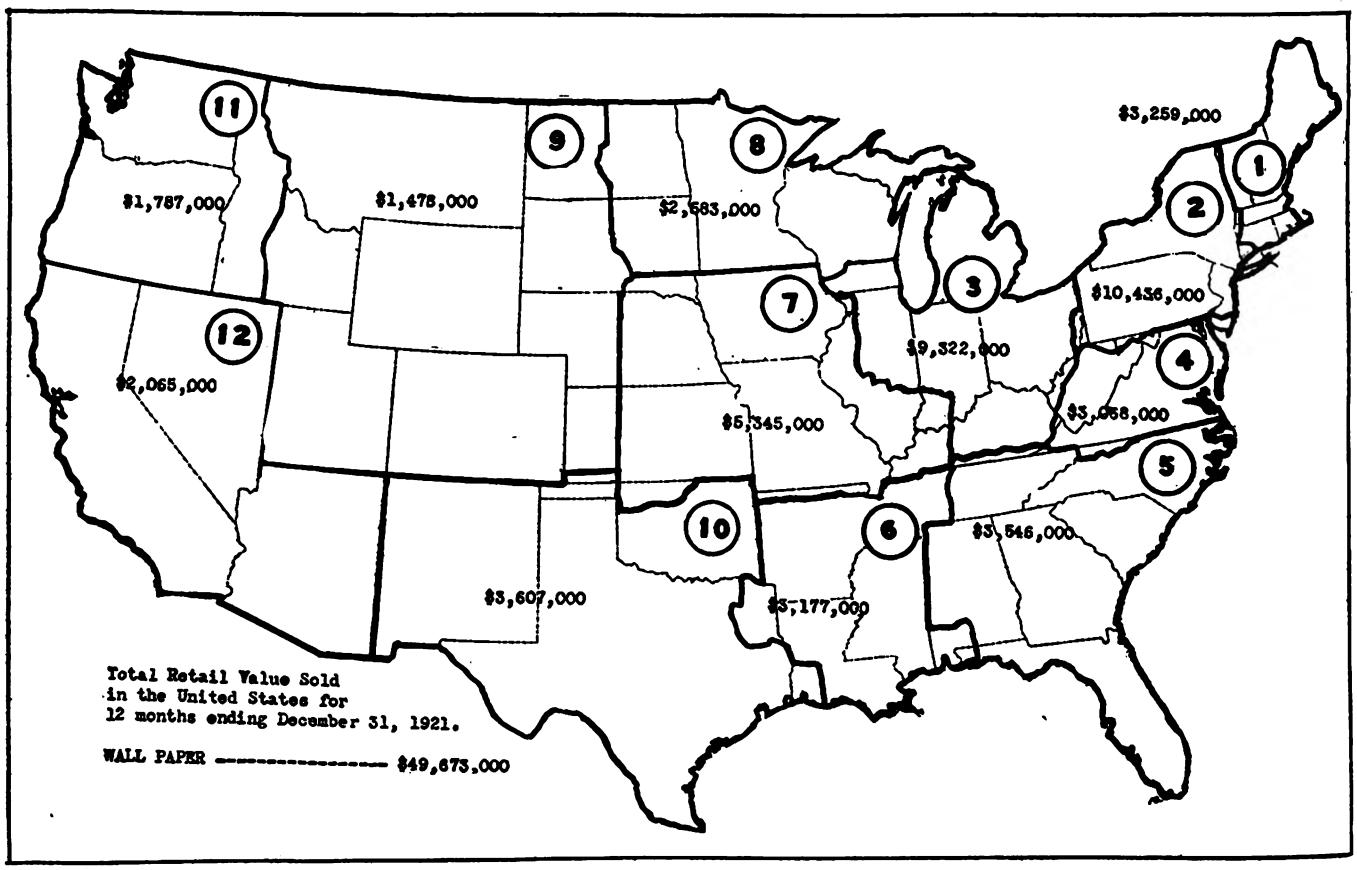
Rumors that paper manufacturers were preparing for a grand rush to the spot market in October, says *The Editor and Publisher,* have not deterred New York City newspapers from setting new records for consumption of newsprint. In July, one of the slackest advertising months in the year, the number of pages used by the New York and Brooklyn newspapers reached the total of 12,440, an increase of 1428 over July last year and 1864 more than they used in July, 1920, when the boom of that year was just beginning to topple.

It is pointed out by L. B. Palmer, of the A. N. P. A., that a comparison of the first six months of this year with the same period of 1920 shows an 11% increase in consumption of newsprint, 1½% increase in production, 8½% decrease in advertising, and both publishers' and mill stocks at very low points.

According to the *Paper Trade Journal,* P. T. Dodge, president of the International Paper Company, expects the price of newsprint paper to rise above $75 a ton in the near future, due to abnormal demands upon mills.

Proposed Standard Substance for Paper. Article prepared to justify recent recommendation that basis weight of substance of given sheet of paper be based on ream of 25x40 in. of 500 or 1000 sheets for all paper. Original must be consulted for tables. Advantages claimed are: Corrects obsolete practice of using as basis for manufacture size that has practically no relation to use or methods of computing values or areas; establishes standard size for use in manufacture of all grades; establishes condition where substance thickness means exactly same weight for all grades when area of sheet is same and where any other size is of proportionate weight; makes easy figuring of special sizes, and reduces liability of error; simplifies commodity from manufacturing and merchandising standpoint and establishes basis that will be understood by all; establishes for paper industry an "area unit" to be used in manufacturing and sale with existing standard. S. L. WILLSON, *Paper Trade J.,* 8-17-22, 2500 w. CJW.

Washing Waste Paper. System consists of combined stuff chest and stock pump, the pump being replaced by bucket wheel which conveys pulp to spout and from there to gravitator, which removes dirt. Gravitator replaces old rifflers. Then passes to screen and into washing machine. Four-point waste water overflow gives cylinders maximum capacity. Stock removed from liquid by cylinders is picked up by couch rolls and dirty water pressed out. This stock drops into agitator and mixing trough. Water consumption small. Eighty per cent to 90% of ink removed in first cylinder. Water from second cylinder is pumped to stock chest and that from third cylinder is pumped into first agitating trough. Only place fresh water is used is in final washing operation in last agitator trough. Simple to control, small power, small consumption of water, no special attention required, and cleaner and brighter stock is claimed. A. J. HAUG, *Paper Mill,* 8-12-22, 750 w. CJW.



Distribution of the $50,000,000 worth of wall-paper sold in the U. S. last year.—(Research conducted by *McCall's Magazine.)*

A Business Motive Power

The time must come when all businesses will consider the advisability of advertising in the same spirit that a manufacturer ponders over the advisability of adopting a new machine. One does not install a piece of labor-saving mechanism because it suits his fancy; but because the efficiency of the business requires it.

He expects the new machine to reduce his cost to operate—perhaps to make a better product—and thus aid him in meeting competition and making larger profits.

Advertising is exactly similar. The man who refuses to consider it as a possible expedient, simply shuts his eyes on one of the problems of his business. He might as well ignore the banks as sources of credit when he has need to borrow capital.

On the other hand, the man who looks to advertising to checkmate all weaknesses and shortcomings of his business and to carry it along to victory despite these, has a childlike faith in the miraculous.

Advertising will not make his product or his service any better than they are; but it will bring him the full benefits of their merits. It will not eliminate wastefulness in his factory or his store; but it will reduce his cost to operate. It will not make illogical selling methods successful; but it will assist good selling methods, and often point the way for improving them.

Advertising is the most inexpensive motive power that the manufacturer or merchant can buy today. It is a form of stimulus that brings excellent returns on the investment.

[Published by THE INDUSTRIAL DIGEST in co-operation with The American Association of Advertising Agencies]



Printing Strike Coming?

IN the past, labor difficulties in the printing crafts of New York City have been the forerunner of similar difficulties in other large centers. Consequently there is more than usual importance attached to the possibility of a strike of the New York unions.

According to statement by *Editor and Publisher,* the closed shop branch of the New York Employing Printers' Association is demanding a 20% cut in the typographical union scale and a 10% cut in the press and bindery scales. The 48-hour week is demanded in all of the crafts except the typographical union. The present wage agreement is effective until September 30. Negotiations are already under way, with the unions presenting counter demands for increased pay. Should the New York unions retain their present wages, it will probably mean difficulties for employers in other centers who attempt to reduce wages.

Printing and Publishing in India. Newspaper printing conditions there are similar to those in other countries, except that occasionally one finds the ancient screw press. Number of papers is comparatively few. English journalists predominate as editors, though there are several native editors and contributors. Three thousand English readers is considered good circulation even in the larger cities. Job work a big feature of every newspaper office, and no job is too small. Color printers unsuccessful so most work is done in England. Article reviews many troubles of the publisher, and gives a good description of printing conditions in India. GEORGE CECIL, *American Printer,* 6-20-22, 1800 w. WRB.

Four-Color Process Printing. Fourth color, or black plate, introduced into process printing due to variation in primary colors (yellow, red, blue) while being printed. Slightest variation in any plate, either stronger or weaker, giving result of grayish tinge. To overcome this, black plate was introduced. Helps irradicate tendency to print lighter, particularly medium and light shades. Suggest furnishing photo-engravers with same stock that job will be printed on, and furnishing ink, and instructions how to use plates, to simplify and standardize results. Important in four-color work to see that dots on engraver's progressive proofs match plates. JULIUS FRANK, *Amer. Printer,* 800 w. MBB.

Starting a Business. Few working printers are now anxious to become proprietors. Risks are so many, cost of starting daily newspaper is very considerable, also printer's paper has been saddled with expense of rake-off, profit and handling before it reaches bed of his cutting machine, 86% of every dollar that customer takes home representing wages in some form. Intensive preparation and an accumulation of technical and business knowledge essential. F. H DOBBIN, *Canadian Printer,* 6-22, 1000 w. MBB.

Modern Publishing and Printing Building. Improvement in design of buildings for printing establishments very marked in recent years. Essential practical requirements are economy of operation in handling materials and freedom from fire hazard. Points to keep in mind in designing: processes and machinery, kinds and quantities of material, number of employees, logical arrangement of departments and machinery, possible future expansion. Very thorough article, covering: location and type, material, arrangement, location of departments, vibration, loads, ceiling heights, wall finish, chutes, flooring and mechanical equipment. GEORGE NORDHAM, *Arch. Forum,* 7-22, 5000 w. CS.

Printing Machine Invention in England. Marked progress in British printing engineering industry. Simpler means for operating mould parts and matrix of typesetters, modifications in connection with removing tang from mould, improvement in metal pump mechanism, improved means of producing variable "dewell" or interval between introduction metal and injection of type. Possibility of valuable improvement in rotary machines for intaglio printing, to increase working speeds. Also method by which pressure of impression cylinder can be adjusted hydraulically. Recent invention printing cylinders of kind with dovetail or undercut longitudinal ribs to receive plurality of plates, have ribs slightly tapering along longitudinal edges, which wedge plates with like edges tightly in position. Improvements in envelope-making machines in type which finishes envelopes. New ticket-printing machine comprises single rotary type carrier for printing on both record and recording slip. Improvement on envelope-folding machines is also recorded. G. BASIL BARHAM, *Amer. Printer,* 7-5-22, 2000 w. MBB.

How Printing May Be Sold. Firm sending out circular letter in advance of their house-organs, offering possible prize for articles on certain specified subjects, gets original publicity material, good "lead" stories, and better advertisements than could often buy. Also printers not only obtain regular printing order from such customers, but circular-letter job as well, as idea pays. KOERT BERGEN, *Amer. Printer,* 5-6-22, 800 w. MBB.

Three Recent Printing and Publishing Buildings. Illustrated description of buildings of Metropolitan Life Co., in Long Island City; A. W. Shaw Co., at Chicago, and Tribune Building, South Bend, Ind., giving plans and construction. *Arch. Forum,* 7-22, 2000 w. CS.

Building a Weekly Newspaper. Successful weekly newspaper must be in nature of co-operative public institution. Is private enterprise with public responsibilities. Must give whole news, regardless of personal feeling; must reflect life of its community conscientiously, this requiring active interest in every phase of public life. News, advertising and circulation problems need able treatment, above all else. S. N. WYNN, *Canadian Printer, 7-22,* 2000 w. MBB.

Important Points on Law of the Press. Federal Statute requires sworn statement as to who are stockholders and bondholders, so as to identify those who back publication directly or financially. Statute as enforced requires trustee holder of stock or bonds to disclose names of those for whom he holds. All reading matter for which money or any consideration, direct or indirect, is paid, is to be marked "advertisement." If not extended to pre-publication censorship, power of State legislature to regulate or penalize publications, exercised within reasonable limits, is upheld. Libel is defamation of a person or association, or corporation not exclusively of Government or municipal character. While liberty of press is assured, yet all persons shall be "responsible for the abuse of such right." Publisher is responsible for libelous matter even when accompanied by signature of writer or when copied fro mother newspapers. Abuse of trial by newspapers is greater in criminal than civil cases. (Cont.) ROME G. BROWN, *Editor and Publisher,* 5-3-22, 2000 w. MBB.

Early Days of Proofreading. Proofreading dates almost from time of printing. At first printers revised own proofs; were highly educated men. With invention of typography specifically assigned proofreading began. In 15th century proofreader was invariably a scholar of high attainments, combined office of textual editor and press corrector. Earliest literature regarding proofreading is contained in treatise by Jerome Hornschuch, doctor of medicine, corrector in Beyer printing office, Meiningen. Next is "Mechanik Exercises" by Joseph Moxon (1683). Such old books show custom of reading copy aloud to compositor, type being set from dictation instead of directly from manuscript. With majority of printing in Latin and Greek, compositors must have necessarily been educated men, some serving in joint role of editor and correcter being Demetrius Chalcondylas, Erasmus, Christopher Plantin and Corneille Kilian. DOUGLAS C. MCMURTIE, *Amer. Printer,* 7-5-22, 2500 w. MBB.

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Reducing handling costs.....1523



RADICALISM

A lot is said about radicalism in industry being a thing of the past.

But the real fact is that there are more radicals here today than ever before, and they are increasing hourly. In the United States nearly 1,250,000 are at present out on strike.

Radicalism spreads like the boll-weevil and results in strife, or, indifference of employees while remaining at work. The economic waste and loss is tremendous.

This condition is but the result of destructive dissemination of unsound principles.

Why not meet these untruths with facts interpreted by an organization facilitated to make itself heard, listened to and understood?

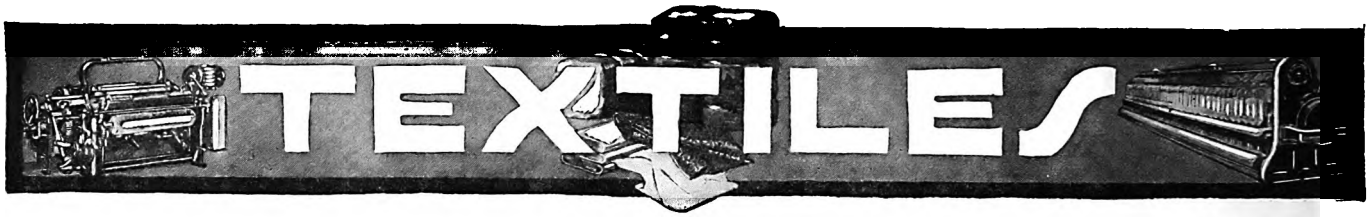
"The Worker's Viewpoint is the Most Neglected Factor in Industry"

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No Decline in Raw Cotton Prices

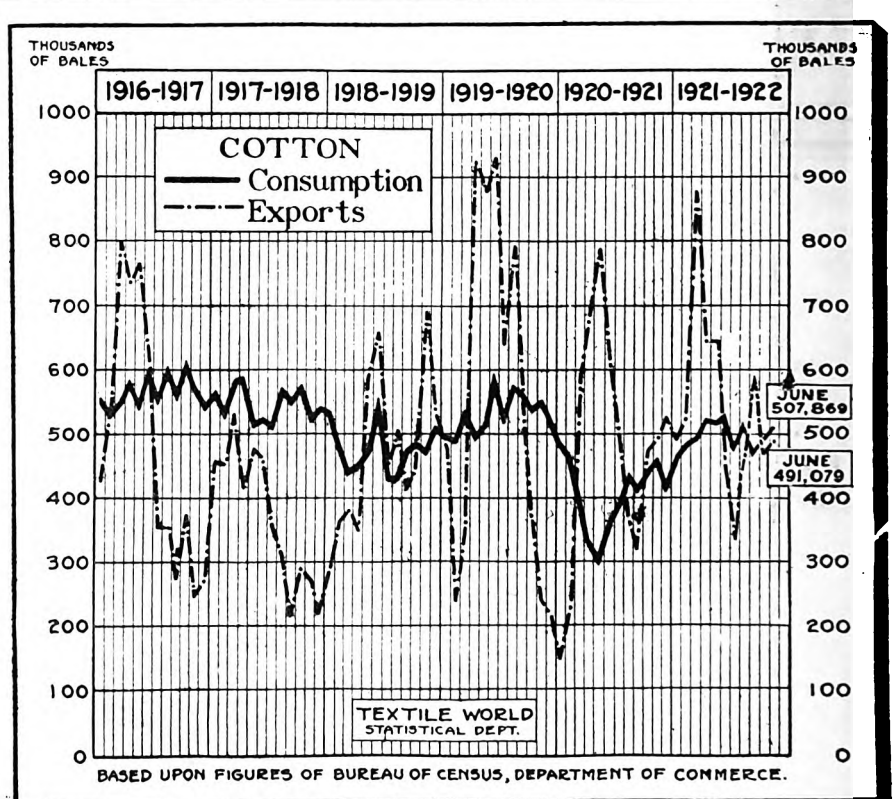
IN the opinion of *The Pacific Coast Merchant,* the improvement in business conditions is being reflected in the textile markets. Although orders for cloth are still being placed conservatively the general tone of the markets is optimistic concerning the prospects for fall trade. The greatest uncertainties are consumer purchasing power and the trend of the raw materials markets. Of the raw materials, cotton is just now the subject of greatest speculation. In reviewing the cotton goods market for the first half of 1922 the *Daily News Record* of New York says that mill men are watching the trend of cotton with considerable concern. In many instances it is reported to be practically impossible to pay prices asked for raw materials and at the same time produce cloth to sell at current market quotations.

But in spite of the difficulty in advancing the price of cloth, there is, according to *Fibre and Fabric,* a strong belief among cotton interests that cotton is going to hold above the twenty-cent level for the greater part of the season. It is believed that the adequacy of the crop to cover consumptive demands will depend in a great measure upon international developments. Should deterioration or the boll-weevil indicate a reduction of the 11,500,000-bale estimate recently made by the government, a serious situation would result, since there exists today the heaviest shortage in cotton fabrics throughout the world experienced in the last half century. "If a large part of the world is hungry, it is likewise short of clothing," says *The Southern Textile Bulletin.* "The question naturally arises where will the available supplies of raw cotton come from to meet the present demands for the raw staple. A secondary query naturally follows to the effect as to where cotton prices go in their upward tendency when the demand overreaches the supplies in such volume. There is but one answer to prices. No definite or imaginary price can be fixed when the world purchasing power is so low. But it is safe to say that the time is most likely to develop during the coming 1922-1923 cotton year when the price of the staple will go as high a level as the mills can pay and profitably market the finished fabric."

"Straight Line" Textile Calculations. For duplication or imitation of fabrics of other mills and comparison of goods and prices, is necessary, determine structure of competing cloth. Analysis of cloth makes possible study of fabrics all parts of world very advantageous. Necessary to learn kind of yarn determined in finished cloth and count of same yarn when spun. Sample to be analyzed should be convenient size (four inches square). SAMUEL S. DALE, *Textiles,* 5-22, 700 w. MBB.

Lime in Textile Industry. Two classes: those operations where greatest amount of lime is required and offers most fertile field for research, such as lime boil, softening water for dyeing, recausticizing of waste caustic liquors, etc., and those processes which require only small tonnage, such as liming kiers, dyeing, preparation of chemics, and scouring of wool. Discussion of how lime should be used. Product uniform in color, not lumpy, very reactive chemically, with calcium oxide content of at least 94%, with less than 2.5% of magnesium, 3% of silica and 2% of iron and alumina, is well suited for lime boils. In dyeing lime should contain less than 1% iron oxide. Lime is cheaper and safer to handle than strong alkalies. Reduces number of uneven boils to minimum. Gives cloth good bottom, which is advantage for firm, permanent finish. Treatment with lime reduces time required when pressure kier is used. Has great efficiency in removing protein matter. E. R. DARLING, *Am. Dyestuff Reporter,* 7-3-22, 1200 w. CJW.

Defects in Piece Dyed Serges. Sizing materials used on warp sometimes cause slightly streaked appearance. Potato starch and flour are difficult to remove. Crabbing and decating or steaming may produce listed effect or gradual shading from side to side. In scouring it is necessary to have proper proportion of alkali in soap. Too neutral soap will cause uneven dyeing. Amount of alkali used should be sufficient to give a little sharp taste to cloth. Streaks and clouds are due to chemical reaction between dye and cloth proceeding at too great speed. Speck dyeing is most common cause of wrinkles, which are caused by running cloth in liquor with insufficient water in washer. Certain dyes sublime when dried on ordinary tenter dryer with fans all pulling in one direction. Uneven pressure on rotary press will give slightly shaded appearance, usually in fork of light center. GEORGE W. HORNE, *Textile Colorist,* 7-22, 1500 w. CJW.



Cotton consumption and exports, 1916-1922. The steady increase in consumption serves to substantiate the claim above of no decline in raw cotton prices.

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Book Department

INDUSTRIAL DIGEST

25 West 45th Street New York City

Tariff Bills Compared

(From page 1473)

Article	Senate Bill	House Bill	Underwood Law
Ground cinnamon, lb.	5c	5c	1c & 20%
Unground mace, lb.	4c	4c	8c
Ground mace, lb.	8c	8c	8c & 20%
Mustard seeds, lb.	1c	1c	Free
Ground mustard, lb.	8c	5c	6c
Unground nutmeg, lb.	2c	2c	1c
Ground nutmeg, lb.	5c	5c	1c & 20%
Red pepper, lb.	2c	2c	1c
Ground red pepper, lb.	5c	5c	1c & 20%
Pepper—			
Black or white, lb.	2c	2c	1c
Ground black, lb.	5c	5c	1c & 20%
Unground sage, lb.	1c	1c	½c
Ground sage, lb.	3c	3c	½c & 20%
Turmeric, lb.	Free	10c	Free
Mixed spices	25%	20%	20%
Teasels	25%	25%	15%

SCHEDULE VIII.

SPIRITS, WINES AND OTHER BEVERAGES

Brandy & other spirits distilled from grain, gal.	$5.00	$5.00	$2.60
Cordials, liquors and bitters, gal.	$5.00	$5.00	$2.60
Angostura bitters, gal.	$2.60	$5.00	$2.60
Champagne & sparkling wines, gal.	$6.00	$6.00	$2.40 $9.60 doz.
Still wines, gal.	$1.25	$1.25	45-60c
Ale, porter, stout, beer, gal.	$1.00	$1.00	45c
Malt extract	60%	60%	45%
Cherry & fruit juices—			
Under ½% alcohol, gal.	70c	70c	70c
Over ½% alcohol, gal.	70c & $5 proof	70c & $5 gallon.	70c up
Ginger ale and soda water, gal.	15c	15c	12-28c dozen
Mineral waters, gal.	10c	10c	10-20c dozen

SCHEDULE IX.

COTTON AND MANUFACTURES OF

Cotton having staple 1 3/16 inches or more in length, lb.	7c	Free	Free
Other cotton	Free	Free	Free
Cotton yarn, unbleached, lb.	1-5c to 28c		5.27½%
Cotton yarn, bleached lb.	¼-34c	¼-34c	5.27½%
Cotton waste	5%	5%	5%
Cotton sewing thread, C yards	1½c	½c	15%
Cotton cloth—			
Unbleached, up	10-30%	9-29%	7½-27½%
Bleached, up	13-33%	13-33%	12½-20%
Printed, up	15-40%	13-33%	12½-30%
Tire fabric	25%	25%	25%
Tracing cloth, sq. yd.	5c & 20%	5c & 17%	30%
Cotton window hollands, sq. yd.	3c & 20%	3c & 17%	25%
Waterproof cloth, sq. yd.	5c & 30%	5c & 20%	25%
Tapestries	45%	30%	35%
Pile fabrics	50%	33 1-3%	40%
Terry woven fabrics	40%	25%	40%
Table damask	30%	28%	25%
Cotton bedspreads	25-40%	20-30%	30%
Sheets, pillowcases, etc.	25%	20%	25%
Table covers, napkins, etc.	20%	23%	30%
Garters, suspenders, etc.	35%	25%	25%
Lamp and stove wicking, lb.	10c & 12½%	10c	25%
Shoe or corset lacings, lb.	15c & 20%	15c & 12½%	25%
		50c	25%
Cotton labels, lb.	50%	& 20%	
Machinery belting	30%	20%	15%
Warp knitting machine fabric	60%	35%	30%
Other knit fabric	35%	23%	30%
Seamless cotton hose:			
Value under $1 doz.	50%	35c & 12½%	30%
Value $1-$1.50 doz.	50%	45c & 12½%	40-50%
Value $1.50-$2 doz.	50%	65c & 12½%	50%
Value $2-$3 doz.	50%	$1.20 & 12½%	50%
Value $3-$5 doz.	50%	$2.00 & 12½%	50%
Value over $5 doz.	50%	35%	50%
Other cotton hose	30%	23%	20%
Knit cotton wearing apparel—			
Under $1.50, doz.	45%	40c & 12½%	30%
$1.50-$3, doz.	45%	70c & 12½%	30%
$3-$5, doz.	45%	$1.20 & 20%	30%
$5-$7, doz.	45%	$1.40 & 25%	30%
$7-$12, doz.	45%	$2.25 & 25%	30%
$12-$20, doz.	45%	$4.00 & 28%	30%
Over $20 doz.	45%	40%	30%
Cotton—			
Clothing	35%	33½%	30%
Collars and cuffs, doz.	35c & 10%	25c & 12½%	30%
Lace curtains	60% up	40% up	35-45%
Handkerchiefs	30% up	25% up	25% up
Other cotton articles	40%	28%	30%

SCHEDULE X.

FLAX, HEMP, JUTE AND MANUTURES OF

Flax straw, ton	$2.00	$2.00	Free
Flax, not hackled, lb.	1c	1c	Free
Flax, hackled, lb.	2c	2c	Free
Flax tow, lb.	¼c	¼c	Free
Hemp, lb.	2c	¼c	Free
Hackle hemp, lb.	4c	1½c	Free
Ramie silver	25%	13%	15%
Single jute yarn, lb.	2½-11c	2½-11c	15-20%
Flax, hemp & ramie yarn	30-40% up	20% up	10-12%
Flax, hemp & ramie thread	40% up	23% up	20-25%
Hard fibre cordage, lb.	¾c	¾c	½c
Bast fibre cordage, lb.	2c	2c	1c
Fishing nets	10%	10%	25%
Vegetable fibre hose, lb.	17c & 10%	26%	7c
Jute fabrics—			
Plain, lb.	1c	1c	Free
Printed, lb.	1c & 10%	1c lb. & 13%	10%
Woven fabrics	35-55%	28-33 1-3%	30-35%
Fibre pile fabrics	40%	33 1-3%	40%
Fibre table damask	50%	28%	35%
Flax towels, sheets, etc.	40-55%	28%	35%
Fibre belting & bindings	50%	28%	30%
Flax tapes	30%	23%	20%
Fibre handkerchiefs	35-45%	33 1-3-36%	35-40%
Fibre clothing	35%	33 1-3%	40%
Flax collars & cuffs, doz.	40c & 10%	28c & 17%	30%
Jute bags, lb.	1c & 10%	1c & 17%	10%
Jute bags, colored	1c & 15%		
Cot. bagging, sq. yd.	6c to 3c lb	Free	Free
Linoleum	35%	28%	30-35%
Floor oil cloth	20%	20%	20%
Straw mattings, sq. yd.	3c	3c	2½c
Cocoa fibre mattings, sq. yard	9c	9c	5c
Do mats, sq. ft.	7c	7c	3c
Other floor coverings	45%	26%	20%
Other fibre woven articles	40%	28%	35%

SCHEDULE XI.

WOOL AND MANUFACTURES OF

Donskov, So. American & similar wools—In the grease, lb.	12	7c	Free
Washed, lb.	18c	7c	Free
Scoured, lb.	24c	7c	Free
Imported on skin, lb.	11c	6c	Free
All other wools and hair of angora goat, cashmere goat, alpacca and like animals—			
In grease or washed, lb.	33c	25c	Free
Imp'td scoured, lb.	33c	26c	Free
Imp'td on skin, lb.	32c	24c	Free
Top waste, lb.	33c	25c	Free
Garnetted waste, lb.	26c	20c	Free
Noils, carbonized, lb.	26c	20c	Free
Noils, uncarbonized, lb.	21c	16c	Free
Shoddy, lb.	18c	14c	Free
Wool rags, lb.	8c	6c	Free
Other wool waste, lb.	18c	14c	Free
Wool advanced beyond washed condition, lb.	36c & 20%	16 2-3c & 10%	8-20%
Wool, yarn, lb.	26c & 30% to 29c & 40%	20c & 15% to 30c & 20%	18-25%
Woven fabrics—			
Under 4 oz. to sq. yd., lb.	40c & 50% to 49c & 50%	30c & 22% to 36c & 27½%	30-35%
Over 4 oz. to sq. yd., lb.	26c & 40% to 29 & 50%	20c & 18% to 36c & 27½%	25-35%
Wool pile fabrics, lb.	45c & 50%	36c & 27½%	40-45%
Blankets, auto robes, steamer rugs, etc.	20c & 30% to 40c & 40%	20c & 20% to 30c & 20%	25%
Felts, lb.	20c & 30% to 40c & 40%	20c & 20% to 30c & 25%	35%
Belts, webbing, etc., lb.	33-40c & 50%	25-36c & 30%	35%
Knit fabrics, lb.	33c & 40% to 49 & 50%	25c & 20% to 36c & 25%	35%
Hose and gloves, lb.	39c & 35% to 49 & 50%	30c & 25% to 36c & 30%	20-40%
Knit underwear, lb.	39c & 30% to 49 & 50%	30c & 20% to 36c & 25%	35%
Knit outerwear, lb.	39c & 40% to 49 & 50%	30c & 28% to 36c & 33 1-3%	35%
Clothing and wearing apparel, lb.	26c & 40% to 49c & 55%	20c & 25% to 36c & 30%	35%
Corpets, rugs, sq. ft.—			
Hand loom Oriental & axminster, etc.	65%	5c & 30%	35-50%
Other axminsters	40%	2c & 25%	35%
Wiltons	40%	3c & 25%	30%
Brussels	40%	2c & 25%	25%
Velvet carpets	30%	1c & 20%	30%
Other floor coverings	25-30%	2c & 25%	20%
Screens	30%	22%	20-35%
Other woolen manf's	55%	25%	35-40%

SCHEDULE XII.

SILK AND WOOL GOODS

Silk partially manufactured, lb.	35%	35c	20c
Spun silk, up	40%	26%	35%
Thrown silk, up	25%	12½%	15%
Sewing silk, gummed, lb.	$1.00	$1.00	15%
Sewing silk ungummed, lb.	$1.50	$1.50	15%
Woven silk fabrics, up	55%	12½%	45%
Plushes, up	60%	33 1-3%	50%
Velvet or plush ribbons, up	60%	33 1-3%	50%
Ribbons, bandings, etc.	55%	33 1-3%	45%
Knit fabrics in the piece.	55%	35%	50%
Underwear, hose, gloves	60%	40%	45%
Handkerchiefs and mufflers—			
Unhemmed	55%	33 1-3%	40%
Hemmed	60%	40%	50%
Silk shirt collars, doz.	60%	50c & 20%	50%
Silk shirts	60%	40%	50%
Other silk wearing apparel	60%	40%	50%
All other silk mufflers	60%	35%	45%
Artificial silk yarns, lb.	25-55c	45-60c	35%

SCHEDULE XIII.

PULP, PAPERS AND BOOKS

Chemical wood pulp, unbleached or bleached.	Free	Free	Free
Printing paper, lb.	1c & 10%	1c & 10%	12%
Paper board, wall board & pulp board, including cardboard	5-10%	10%	25%
Leather board	10%	10%	Free
Sheathing paper	10%	10%	5%

Sheathing felt	10%	10%	Free
Filter masse or stock, wholly or partly of wood pulp, lb.	20%	1½c & 15%	20%
Indurated fiber ware, pulp & papier mache manufactures	25%	23%	25%
Tissue, stereotype, copying and carbon paper, lb.	5c & 15%	5c & 15% to 6c & 15%	30%
Surface-coated papers, lb.	5c & 15%	5c	25%
Playing cards, pack			
Papers, coated surface, embossed or covered with metal, lb.	15c & 20%	5c & 15%	25%
Papers, covered with metal leaf or fancy effect not lithographic, lb.	4½c & 15%	4½c & 17%	35%
Decalcomania paper	5c	5c	Free
Cloth-lined paper, lb.	5c & 15%	5c & 17%	35%
Wax-coated papers, lb.	3c & 15%	3c & 13%	35%
Bags, printed matter other than lithographic, boxes, etc., lb.	5s & 20%	5c & 20%	35%
Plain basic photographic paper, lb.	3c & 15%	3c & 15%	15%
Sensitized paper, lb.	3c & 20%	3c & 20%	25%
Wet transfer paper	65%	30%	25%
Pictures, cards, calendars, labels, cigar bands, etc.; lithographically printed music periodical or newspaper illustrations, etc., lb.	25-65c	20-55c	15-40c
Writing, letter, note, drawing, Japan, ledger, bond, record tablet typewriter & onion skin papers lb.	3c & 15%	3c & 15%	25%
Same, ruled, printed, etc., shall pay in addition	10%	10%	....
ro newspaper illustro-	3c	3c	25%
Bristol board, lb.	& 15%	& 15%	
Paper envelopes shall pay same rate of duty as paper from which made and in addition thereto—			
If plain	5%	5%	13%
If printed, etc.	10%	10%	35%
Jacquard designs on ruled paper	35%	23%	25%
Hanging paper, not printed	10%	10%	25%
Do, printed	1½c & 20%	20%	25%
Wrapping paper	30%	23%	25%
Blotting paper, lb.	30%	2c & 10%	25%
Filtering paper, lb.	5c & 15%	5c & 15%	30%
Books of all kinds, bound or unbound—	15%	20%	15%
Bona fide authorship.	25%	20%	15%
All other			
Leather bound books, chief value of which is the binding	45%	33 1-3%	15%
	25%	20%	4c
Children's books, lb.	15c	15c	10c
Booklets, decorated, lb.			
Booklets, lithographically printed, lb.	7c	7c	7c
All postcards, not including American views	30%	26%	25%
Views of landscape, scene, building, place or locality in U. S.:			
Thicker than 8-1000 inch, lb.	15c & 25%	15c & 20%	20c
Thinner than 8-1000 inch, per M	$2.00	$2.00	$2.00
Greeting cards, with text	45%	30%	25%
Greeting cards, without text	30%	30%	25%
Photograph, autograph, scrap, postcard, postage stamp and phonograph record albums	30%	23%	25%
Playing cards, pack	10c & 20%	60%	60%
Papers, pulp board and cardboard, cut, die cut or stamped into designs, initials, monograms, lace borders, etc.	30%	23%	25%
Press boards and press paper	30%	23%	25%
Stereotype matrix mat	35%	28%	25%
Wall pockets	40%	26%	25%
Papier mache boxes	40%	26%	25%
Other mfs. of paper	40%	26%	25%

SCHEDULE XIV.

SUNDRIES

Asbestos—Mfrs. of—			
Paper and millboard, long fibre, lb.	25-30%	8c	10%
Other fibres, lb.	25-30%	1½c	10%
Sheets & plates, not exceeding—			
⅛-inch, sq. ft.	25-30%	1c	10%
¼-inch, sq. ft.	25-30%	2c	10%
Exceed. ¼-in. sq. ft.	25-30%	2½c	10%
Not flat, sq. ft.	25-30%	3½c	10%
Col'rd, stained, mixed, sq. ft.	25-30%	3½c & 10%	10%
Wick and rope, lb.	25-30%	18c	10%
Woven sheet package in rolls, lb.	25-30%	24c	10%
Gaskets, lb.	56c	56c	10%
Yarn, more than 10% foreign matter, lb.	32c	32c	20%
Yarn, less than 10% exceeding 25-1000 in. thickness, lb.	84c	84c	20%
Yarn not exceeding 25-1000, lb.	$1.68	$1.68	20%
Textile fabrics, not more than 20% foreign matter, lb.	42c	42c	20%
Do more than 20%, lb.	32c	32c	....
Mantle threads, lb.	$1.40	$1.40	20%
All other mfrs. of asbestos not specially provided for	20%	20%	20%
Sporting goods	20-30%	30%	According to chief material
Spangles and beads, not including imitation pearl beads and other imitations	35%	25%	35%
Pearls other than imitation	45%	25%	35%
Imitation pearls	60%	40%	35%
All other beads in imitation of precious stones	45%	45%	35%
Ramie hat braids	30%	30%	40%
Mfrs. of same	40%	40%	50%
Boots, shoes, foot-wear, uppers of wool, cotton, silk, etc.	40%	25%	....
Braids, not bleached, dyed, for hats, bonnets or hoods	15%	13%	15%
Same, bleached, dyed	20%	17%	20%
Hats, of same, not blocked or trimmed	35%	25%	25%
Same, blocked	50%	33 1-3%	40%
Harvest hats of straw, less than $3 per dozen.	30%	20%	....
All other hats of above material, if sewed	60%	40%	....
Brooms of corn, straw, wood, fiber	15%	15%	15%
Toothbrushes, toilet brushes	45%	35%	35%
All others, not specially provided for, including feather dusters	45%	30%	35%
Bristles, lb.	7c	7c	7c
Button forms, not exceeding 3 in.	10%	10%	10%
Buttons of horn or vegetable ivory, per line, per gross	1¼c	1¼c	35%
Vegetable ivory button blanks, per line	1c	1c	40%
Buttons of pearl or shell, per line	1¾c	1¾c	25%
Pearl or shell button blanks, per line	1¼c	1¼c	40%
(Note—In addition to above duties in Senate, bill imposes 25% ad. val., and House bill 15%.)			
Agate buttons	15%	15%	15%
Collar and cuff buttons and studs, bone, mother of pearl, agate	45%	38%	40%
Cork bark, cut, lb.	8c	8c	4c
Cork stoppers over ¾ inch diameter, lb.	20c	20c	12c
Same, artificial or composition, lb.	10c	10c	15c
Cork stopper, under ¾ inch, lb.	25c	25c	15c
Same, artificial, lb.	12½c	12½c	3c
Artificial cork, lb.	6c-10c	6c-10c	3c
Granulated or ground cork	30%	25%	½c lb.
Cork manufactures	30%	25%	30%
Dice, dominoes, chessmen, pool, balls, poker Chips, etc.	50%	40%	50%
Dolls and other toys, not of china or earthenware and specially provided for	70%	40%	35%
Emery, abrasive grains, artificial, manuf'd, lb.	1c	1c	1c
Emery manufactures	20%	25%	20%
Firecrackers lb.	8c	8c	8c
Roman candles and other fireworks, not specially provided for, lb.	12c	12c	10c
Matches, per gross of boxes, not more than 100 per box	12c	6c	3c
Otherwise than in boxes of not more than 100, per 1,000	1c	¾c	1c
Wax matches, matches in folders, tapers, fuses, night lights, etc.	45%	30%	25%
Percussion caps, cartridges and empty shells	30%	25%	15%
Blasting caps, not more than one gram, per thousand	$2.25	$2.25	$1.00
Same, more than one gram, per thousand, each additional gram	75c	75c	....
Mining, blasting fuses, per 1,000 feet	$1.00	$1.00	$1.00
Feathers and downs, not dressed	20%	20%	20%
Same, dressed	60%	45%	40%
Natural leaves, shrubs, etc., chemically treated	65%	45%	60%
Boas and wreaths of feathers and flowers	60%	50%	60%
Furs dressed on the skin, except silver or black fox furs, not advanced further than dyeing	30%	20%	30%
Mats of dogs and goat skins	10%	10%	10%
Manufactures of furs, except silver and black fox	40%	35%	40%
Silver or black fox skins, dressed or undressed, and manufactures thereof	50%	40%	40%
Wearing apparel of hides or skins of cattle, dog or goat skins, not specially provided for	15%	15%	15%
Same of fur, not specially provided for	50%	50%	50%
Hatters' furs or furs not on the skin	35%	22%	15%
Fans of all kinds, except palm leaf	50%	40%	50%
Gun wads	20%	10%	10%
Human hair, raw	10%	10%	10%
Same, cleaned, not manufactured	20%	20%	20%
Manufactures of human hair	35%	35%	35%
Hair, curled, for mattresses	10%	10%	10%
Hair cloth, crinoline and hair seating	35%	35%	15-16c per sq. yd.
Hair felt	25%	25%	25-35%
Manufactures of hair felt	35%	35%	10%
Manufactures of cattle hair or horse hair, not specially provided for.	40%	....	....
Hats for men, women and children, valued at not more than $4.50 per doz.	$1.50	$1.50	45%
do, $4.50 to $9 per doz.	3.00	3.00	45%
do, $9 to $15 per doz.	5.00	5.00	45%
do, $15 to $24 per doz.	7.00	7.00	45%
do, $24 to $30 per doz.	10.00	10.00	45%
do, $36 to $48 per doz.	13.00	13.00	45%
do, over $48 per doz.	16.00	16.00	45%
(Note—In addition to above hats from animals, imposes 30% and House bill 20%.)		Senate bill on	
Hides of cattle, raw or pickled, lb.	Free	Free	Free
do, dried, lb.	Free	Free	Free
Jewelry, above 20c per doz. pieces in value	80%	55%	60%
Ropes, chains, etc., not exceeding ½-in. in diameter, valued above 30c yard; smokers' articles, mesh bags, vanity cases, etc.	80%	55%	60%
Stampings, galleries and other materials of metal for manufacture of above articles	75%	45%	50%
Diamonds and other precious stones, cut or uncut and not advanced in value	10%	10%	10%
Pearls and parts thereof, not set or strung	20%	10%	10%

Diamonds and other precious stones, cut and unset	20%	20%	20%
Synthetic cut stones	20%	20%	20%
Imitation pearls, and imitations of other precious and semi-precious stones	60%	45%	20%
Laces of all kinds, not specially provided for	90%	45%	60%
Embroideries of all kinds, not specially provided for	75%	37½%	60%
Band, bend, rough and sole leather	Free	20%	10%
Belting and harness leather	Free	20%	10%
Calf and veal skins, tanned	Free	20%	10%
Patent or enameled leather of cattle	Free	20%	10%
Same, not hide of cattle	Free	20%	10%
Chamois skin & glove leather	20%	20%	15%
Pianoforte leather	20%	20%	15%
Upper leather, finished cattle	Free	Free	Free
All other upper leather, finished	Free	Free	Free
Leather cut into uppers	Free	Free	Free
Case, bag, scrap leather, etc., cattle	20%	Free	Free
Same, not of cattle	20%	Free	Free
Leather shoe laces, per gross	Free	Free	Free
Boots and shoes, hides of cattle	Free	Free	Free
All other boots, per pair	Free	Free	Free
Bags, baskets, belts, of leather or parchment and manufactures of leather, raw hide	30%	25%	30%
Same with dining or similar set	45%	30%	35%
Gloves, leather — Men's not over 12 in. long, doz.	$5.00	$4.00	$1.00
Same, women's and children, doz.	4.00	3.00	1.00
For each inch in excess of 12 in., per doz.	50c	50c	....
For each inch in excess of 14 inches	....	....	25c
In addition, gloves lined with cotton, wool or silk, per doz.	$2.40	$2.40	....
When lined with leather or fur, in addition, per doz.	$4.00	$4.00	....
Embroidered, in addition, per doz.	40c	40c	....
(Note. — The Senate bill provided that all the foregoing shall pay not less than 50% nor more than 70% ad val.; the House bill 37½ ad val.)			
Catgut, whip gut, oriental gut and manufactures thereof	50%	25%	Free
Worm gut	Free	25%	Free
Manufactures of worm gut	50%	....	20%
Gas, kerosene or alcohol mantles, treated with chemicals	50%	30%	25%
Harness, saddles, valued at less than $70 & $40.	Free	....	....
Do, valued at more than $70 & $40	35%	....	....
Cabinet locks, not over 1½ in. in width, per doz.	70c	....	....
Same, 1½ ins. to 2	$1 & 20%	....	....
Same, over 2½ ins.	$1.50 & 20%	....	....
Padlocks, not over 1½ ins. in width, per doz.	35c	....	....
Same, 1½ ins. to 2½	50c & 20%	....	....
Same, over 2½ ins.	75c & 20%	....	....
Padlocks, of cylinder construction, not over 1½ ins., per doz.	$1	....	....
Same, 1½ to 2½ ins.	$1.50 & 20%	....	....
Same, over 2½ ins.	$2 & 20%	....	....
All other locks of pin-tumbler or cylinder construction, doz.	$2 & 20%	....	....
Manufactures of amber, bladders or wax	25%	25%	10%
Manufactures of bone, chip, grass, horn, quills, India rubber, gutta percha, palm leaf, straw, weeds, or whalebone	20%	20%	10-25%
Automobile, motorcycle and bicycle tires of rubber	10%	10%	10%
Molded insulators and insulating materials of India rubber	30%	30%	10%
Combs, horn or metal	50%	35%	25%
Ivory tusks in natural state or cut vertically across grain	10%	Free	Free
Manufactures of ivory or vegetable ivory; of mother of pearl, shell, plaster of Paris, India rubber; shells engraved or manufactured otherwise	35%	30%	25%
Electrical insulators and other articles, manufactured, of shellac copal, or synthetic phenolic resin	30%	30%	....
Moss and sea grass, eel grass, sea weeds, manufactured or dyed	10%	10%	10%
Musical instruments, and parts thereof, cases for musical instruments	40%	35%	35%
Tuning pins, per thousand	$1 & 35%	$1 & 25%	35%
Violins, violas, violoncellos, double basses, assembled	45%	$1.50 & 35%	35%
Unassembled parts of foregoing	40%	85%	35%
Phonographs, gramophones, graphophones	30%	30%	25%
Calendar rolls	35%	25%	....
Rosaries and similar articles of religious devotion, except if of gold, silver or precious stones, valued at not more than $1.25 per doz.	15%	15%	....
Same, at more than $1.25 per doz.	30%	30%	....
Same, of gold and silver or precious stones	50%	....	....
Sponges	15%	15%	10%
M'factures of sponges	25%	25%	15%
Violin rosin	15%	10%	10%
Works of art, paintings, drawings, etc., for sale	25%	15%	15%
Peat moss, per ton	50c	50c	50c
Pencils of paper, wood or other material, per gross	40c	50c&25%	36c&25%
Pencil leads not in wood or other material, per gross	6c	6c&20%	10%
Refill leads, per gross	10c	10c&20%	....
Crayon leads, per gross	10%	60c&20%	....
Photographic cameras and parts thereof	20%	30%	15%
Photographic dry plates	15%	20%	15%
Photographic & moving picture films, not exposed or developed	4c	20%	2c ft.
Same, exposed	2c ft.	30%	3c gt.
Same, exposed and developed	3c ft.	30%	3c ft.
Photographic film positives, imported for exhibition	1c ft.	30%	1c ft.
Films if exposed abroad by American producer for production, 60% of which is made in U. S.	1c	25c	....
Pipes and smokers' articles: Pipes and pipe bowls of clay valued at not more than 40c per gross, per gross	15c	15c	25%
Same, valued at more than 40c	45%	45%	25%
Pipe bowls, pipes, cigar and cigarette holders, of whatever material, pouches, cases, cigarette books and paper and all smokers articles not specially provided for	60%	45%	50%
Meerschaum, crude or manufactured	20%	Free	Free
Plush, black, hatters' plush, of silk or silk and cotton, per lb	$1 to $2.40 and 60%	10%	10%
All thermostatic bottles, carafes, etc., finished or unfinished; capacity 1 pint or less	20c&50%	10c&30%	..
Same, more than one pint	40c&50%	20c&30%	..
Parts of foregoing	60%	35%	....
Umbrellas, parasols, sunshades, covered with material other than paper or lace, not embroidered	40%	35%	35%
Walking canes	40%	35%	30%
Handles and sticks for umbrellas, etc.	40%	30%	30%
Waste, not specially provided for	10%	10%	10%
White bleached beeswax	25%	15%	Free
There shall be levied on importation of all new or unmanufactured articles not enumerated or provided for, a duty of	10%	10%	10%
Same, on all articles manufactured in whole or in part	20%	20%	15%

Freight Tie-up Coming

(From page 1475)

The Government has attempted to prepare for a possible rail tie-up by issuing priority orders to the railroads. The Interstate Commerce Commission commanded that in case the roads east of the Mississippi, which will handle the big coal shipments, should be unable to transport immediately all freight offered to them they must handle the goods in the following order: First, foods for human consumption, then feed for livestock, livestock themselves, perishable products, coal, coke, fuel oil, and last, all other commodities. The Commission has issued further orders for the expedition of service by the efficient routing of cars and the prompt return of empties to points of shipment. These orders may help in case of congestion; but if priority is put into effect industry will suffer, since manufactured articles are last on the list.

The Coal Strike

(From page 1477)

particularly excited Congress, and led the Senate to attempt to appear busy in the public interest. Until the strike began to show signs of having a distressing effect on the consuming public Congress was neither excited nor busy.

The rail strike is still deadlocked. The railroads showed by their attitude in the negotiations conducted by the train service brotherhoods that they are confident of winning the shop strike. They refused to yield an inch from their position on seniority. The end of the rail strike is not in sight now, although spokesmen for the railroads say that it will collapse promptly. Organized labor has stuck so closely to the shopmen so far that it is probable that it will continue to give the railroad strikers its support, and thus the struggle will be prolonged.

Passing the Buck

(From page 1479)

a market for the Shipping Board's efficient, but now unsalable tonnage.

"3. The Board would then be able to sell its three million deadweight tons of high-grade vessels, and, even at a minimum of $35 a ton, there would be returned to the Government more than $100,000,000, or sufficient to pay the new subsidy for years.

"4. With the vessels sold, the Government would be out of the shipping business, and the present subsidy of $50,000,000 per year would be eliminated.

"5. An adequate merchant marine would be established under the American flag, adapted to meet the country's needs in peace or war."

These two matters, the tariff, and the President's strike laws and coal commission bill are just about all Congress will be able to attend to for some time. It devoted a little time earlier in the session to one other important industrial matter—the problem of Muscle Shoals—but this it has abandoned completely. It is not going to make any attempt to prevent the $100,000,000 investment in the Tennessee River power plant from going to waste. It is not going to provide for the manufacture of cheap fertilizer so that the farmers can double their output. It is not going to help the industries of the South to get more cheap hydro-electric power. What does Congress care about such things?

You see, November is coming. Our Congressmen will be extremely busy then.

Our Neglected Waterways

(From page 1482)

"On Monday, May 15, there arrived at the municipal docks in north St. Louis a huge Federal barge containing what remained of a big shipment of red cedar shingles by way of the Panama Canal and thence northward via the Mississippi, stopping at Cairo and Cape Girardeau to unload several carloads of the shingles which had been bought by lumbermen in those places. The remainder of the shipment of fifteen carloads was taken by leading St. Louis retailers, who were present on the docks to witness the unloading of the shingles by the use of the huge municipal dock crane, and their transfer to trucks and cars for delivery to the yards of the local purchasers."

This is a splendid illustration of the possibilities of shipment of lumber, shingles and related commodities from the Pacific Coast to St. Louis by the all-water route. These shingles were shipped from Seattle to New Orleans, the steamer touching at the port of Mobile and then proceeding to New Orleans, where the shingles were reloaded on the large steel barge of the Mississippi Warrior Line. The barge carried in addition to her other cargo 14 carloads of shingles, six of them being billed to southern Illinois and southeast Missouri retailers, and the other eight to St. Louis.

It fully demonstrated the possibilities of the all-water route for the shipment of lumber and shingles from the west coast to this market, and it is believed will result in the reduction of freight from Pacific Coast points, inasmuch as it will encourage water competition and show the railroads the necessity and desirability of lower rates on this class of commodity.

A writer in the *Traffic World* says: "If all the principal or trunk-line rivers were adequately developed at this time there would now be available many times the vessel tonnage at present existing for use on these waters, and by coordination with motor trucks to the interior, most certainly the immediate necessities of the country could be taken care of during all strike periods. As to preventing a railroad strike, I am not so sure it would do this; and yet it might, for both labor and railroad management seeing most of the business moving by water and the public indifferent to their fight, would not be so ready to part terms and suspend operation."

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PROVIDENCE	ST. LOUIS	DETROIT	RICHMOND	HOUSTON
WASHINGTON	KANSAS CITY	CINCINNATI	BALTIMORE	DENVER

The INDUSTRIAL CALENDAR

Secretaries of Associations are invited to send us the dates of their conventions as early as possible so that their conventions may be properly listed below. When especially requested by Association Secretaries, we will send dates and other available notices concerning meetings of other associations.

Sept. *American Society Agric. Engineers Reclamation,* Second National Convention, Kansas City, Mo.

Sept. *Amalgamated Assn. Street & Railway Employees of America,* National Convention, Oakland, Cal. (R. L. Reeves, Secretary, 260 E. High St., Detroit, Mich.)

Sept. 1-7. *Natural Gas and Petroleum Association of Canada,* Niagara Falls, N. Y. (S. A. Morse, Secretary, 48½ Market Square, Chatham, Ont.)

Sept. 4-9. *American Chemical Society,* Carnegie Music Hall, Pittsburgh, Pa. (Charles L. Parsons, Secretary, Box 1505, Washington, D. C.)

Sept. 4-9. *Gas and Fuel Section of the American Chemical Society,* Pittsburgh, Pa. (Dr. R. S. McBride, Secretary, Colorado Bldg., Washington, D. C.)

Sept. 5-7. *Engineering Institute of Canada,* Winnipeg, Man.

Sept. 5-7. *Rocky Mountain Coal Mining Institute,* Colorado Springs. (F. W. Whiteside, Secretary, Victor American Fuel Company, Denver.)

Sept. 7-9. *New York State Coal Merchants' Association,* Richfield Springs, N. Y. (G. W. F. Woodside, Secretary, Arkay Bldg., Albany, N. Y.)

Sept. 11. *International Union of Steam and Operating Engineers,* Minneapolis. (Dave Evans, Secretary, 6334 Yale Ave., Chicago.)

Sept. 11-15. *Association of Iron and Steel Electrical Engineers,* Cleveland. (J. F. Kelly, Secretary, Empire Bldg., Pittsburgh.)

Sept. 11-16. *Bakery Equipment and Material Exposition,* Municipal Pier, Chicago, Ill. (B. M. Warner, Secretary, Conway Bldg., Chicago, Ill.)

Sept. 11-16. *International Assn. Printing House Craftsmen,* Boston.

Sept. 11-16. *National Association of Stationary Engineers,* Des Moines, Ia. (Fred W. Raven, Secretary, 417 So. Dearborn St., Chicago.)

Sept. 11-16. *National Exposition of Chemical Industries,* Grand Central Palace, New York. (F. W. Payne, Sec., Grand Central Palace.)

Sept. 12-14. *Retail Bakers of America, Chicago.* (J. M. Hartley, Secretary, 10 S. La Salle St., Chicago.)

Sept. 12-15. *American Bakers Assn., Chicago.* (H. E. Barnard, Secretary, 1135 Fullerton Ave., Chicago, Ill.)

Sept. 12-15. *New England Water Works Association,* New Bedford, Mass.

Sept. 12-15. *Atlantic Deeper Waterways Assn.,* Portland, Me.

Sept. 13-15. *Motor and Accessory Manufacturers' Assn.,* Lafayette Hotel, Buffalo, N. Y.

Sept. 14-16. *American Assn. of Port Authorities,* Toronto, Ont.

Sept. 19-22. *Pacific Coast Gas Assn.,* Santa Barbara, Cal. (W. M. Henderson, Secretary, 445 Sutter St., San Francisco, Cal.)

Sept. 21-23. *American Electrochemists Society,* Hotel Windsor, Montreal, Canada.

Sept. 23-27. *National Assn. of Cost Accountants,* Atlantic City, N. J.

Sept. 23-30. *New York Closed Car Show,* Grand Central Palace, New York.

Sept. 25. *American Institute of Mining and Metallurgical Engineers,* San Francisco, Cal.

Sept. 25-28. *Illuminating Engineering Society,* Boston, Mass. (Clarence Law, Seccretary, Irving Pl. and 15th St., New York City.)

Sept. 25-28. *Southwest Water Works Association,* Arlington Hotel, Hot Springs, Ark.

Sept. 25-29. *National Association Retail Druggists,* Detroit, Mich. (S. C. Henry, Secretary, 168 N. Michigan Blvd., Chicago, Ill.)

Sept. 25-29. *National Drainage Congress,* Kansas City, Mo.

Sept. 25-30. *American Society for Steel Treating,* Detroit. Tentative.

Sept. 25-30. *National Association Advertising Specialty Mfrs.,* Chicago, Ill. (B. Blackwood, Secretary, 208 S. LaSalle St., Chicago, Ill.)

Sept. 26-30. *National Assn. Ry. & Utilities Commissioners,* National Convention, Detroit, Mich. (James B. Walker, Secretary, Pelham Manor, N. Y.

Oct. 2-4. *Grain Dealers National Association,* New Orleans, La.

Oct. 2-6. *American Society for Municipal Improvements,* Cleveland, O.

Oct. 2-6. *American Bankers' Association,* Hotel Commodore, New York. (W. G. Fitzwilson, Secretary, 5 Nassau Street, New York City.)

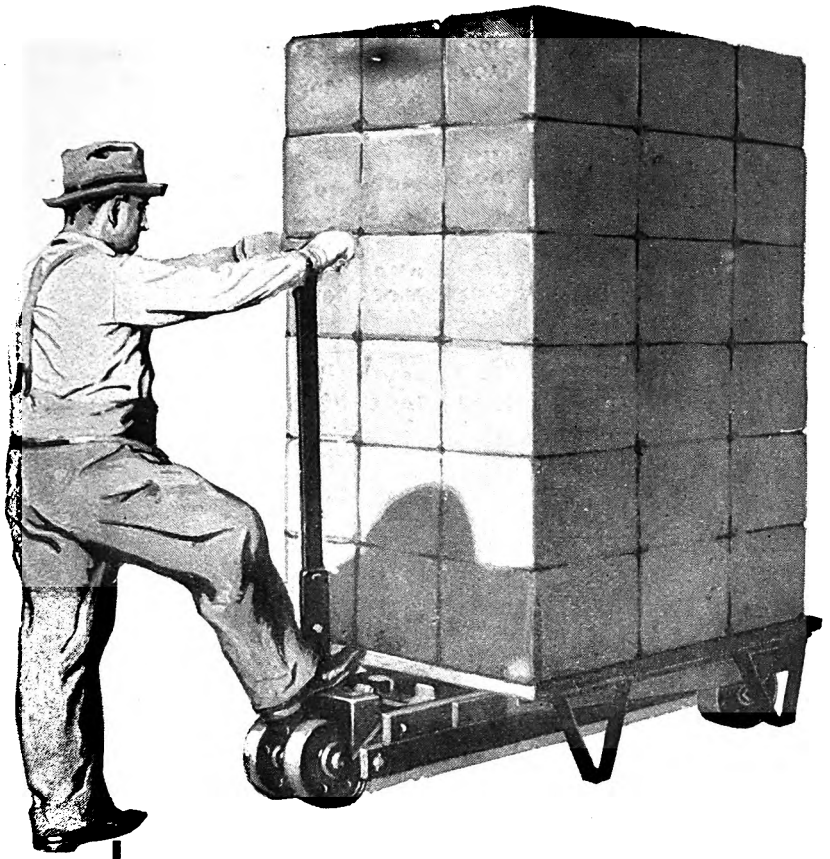
Oct. 2-7. *American Society for Steel Treating,* General Motors Building, Detroit, Mich. (W. H. Eisenman, Secretary, 4600 Prospect Avenue, Cleveland, Ohio.)

Oct. 2-7. *Fire Prevention Exposition,* office 405 Lexington Avenue, New York City.

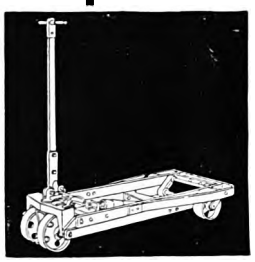
Oct. 4-5. *National Association of Cotton Manufacturers,* Hotel Traymore, Atlantic City, N. J.

Foreign Events

September. *Sociedad Rural Argentina,* Buenos Aires, Argentina.
Sept.-Nov. *Engineers Congress,* Rio de Janeiro, Brazil.
Sept. 5-15. *Second Eastern Fair,* Lemberg, Poland.
Sept. 7-Nov. 12. *International Exposition (centennial),* Rio de Janeiro, Brazil.
Sept. 15. *International Fair,* Bandoeng (Java).
Sept. 15-20. *Automobile Show,* The Hague, Holland.
Sept. 18-23. *Second Annual Meeting of the International Chamber of Commerce,* Rome, Italy.
Sept. 21. *Textile Fair,* Hamburg, Germany.
Sept. 22-25. *Fifth International Fur Fair,* Lucerne, Switzerland.
Sept. 25-Oct. 3. *Automobile Show* at the Kaiserdamm Hall, Berlin, Germany.
Oct. 1-15. *General International,* Lyons.
Oct. 4-15. *Automobile Show,* Grand Palais, Paris, France.
Oct. 12-23. *International Commercial Vehicle Exhibition* at Olympia, London, England.



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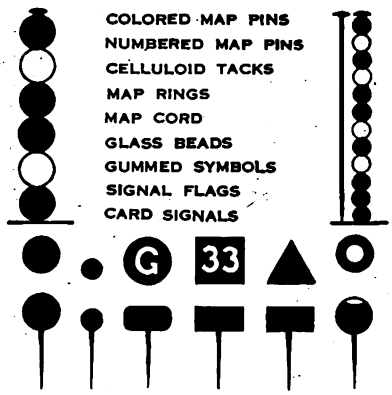
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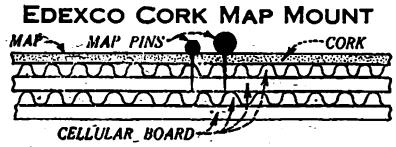
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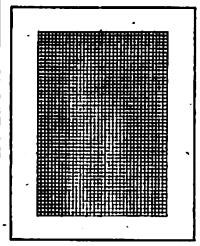
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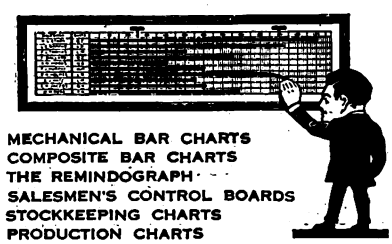
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UNIVERSAL NO. 162
HALFBYTEN NO. 164
TENBYTEN NO. 165
MILLIMETER NO. 167
YEARBYDAYS NO. 171
BARGRAPH NO. 174

ARITHILOG
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"The graphic art depicts magnitudes to the eye. It does more. It compels the seeing of relations. We may portray by simple graphic methods whole masses of intricate routine, the organization of an enterprise, or the plan of a campaign. Graphics serve as storm signals for the manager, statesman, engineer; as potent narratives for the actuary, statist, naturalist; and as forceful engines of research for science, technology and industry. They display results. They disclose new facts and laws. They reveal discoveries as the bud unfolds the flower.

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HENRY D. HUBBARD,
Assistant to Director, U. S. Bureau of Standards,
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The INDUSTRIAL DIGEST

September 16

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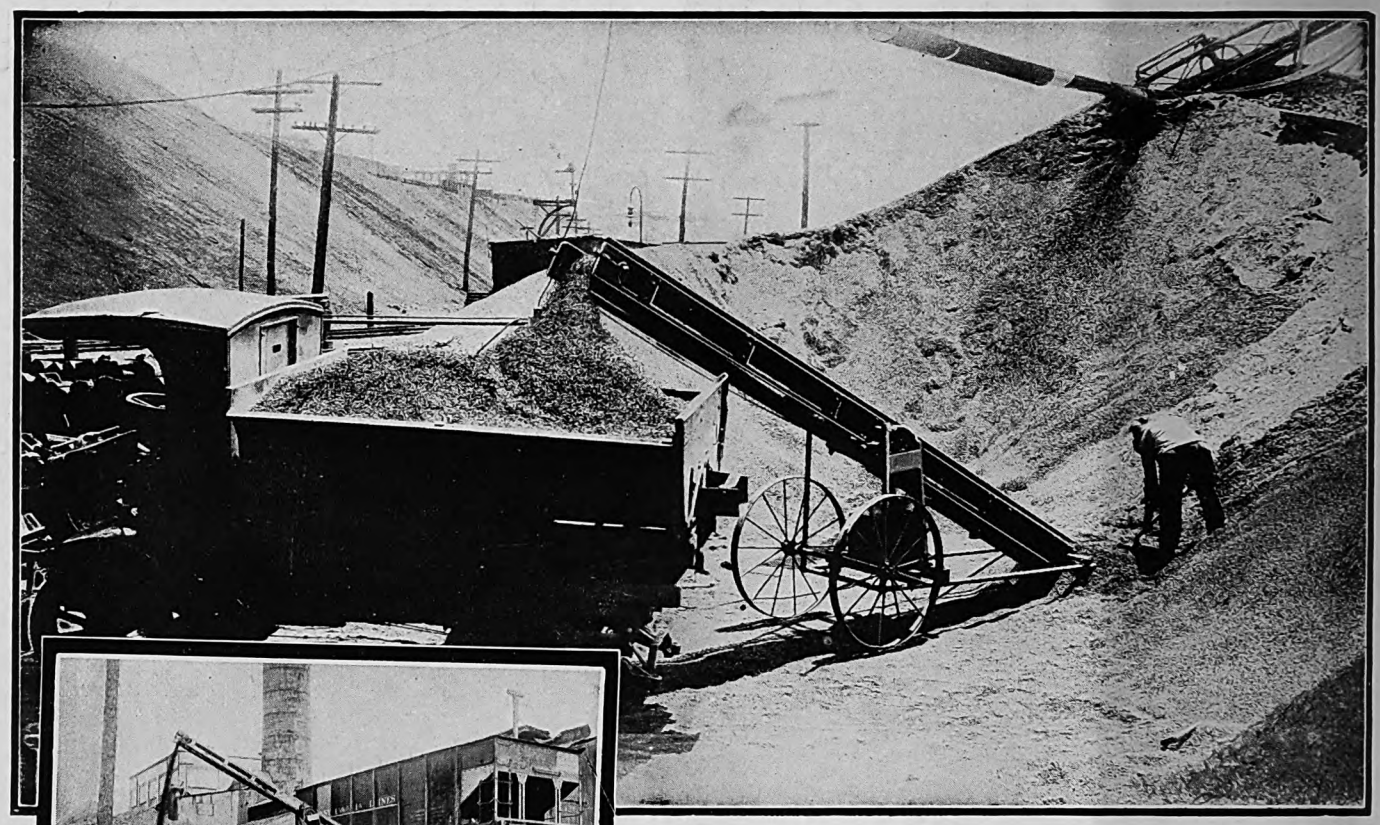


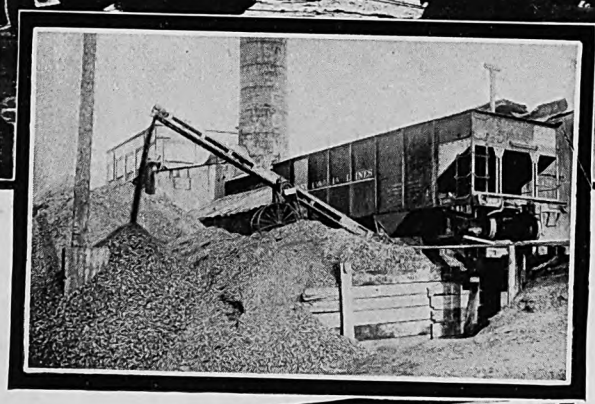
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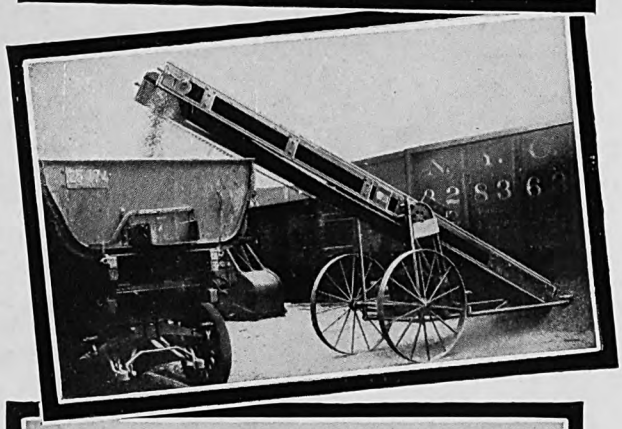
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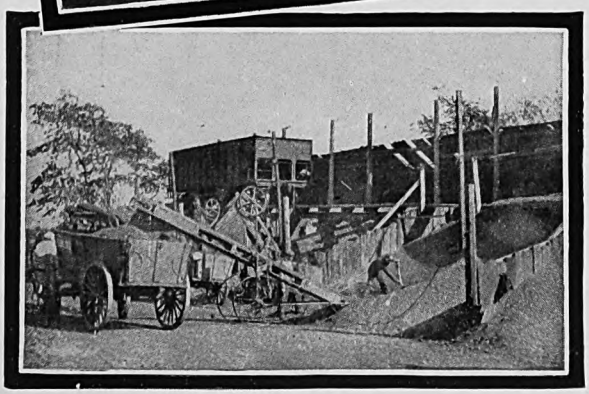
See page 1540

rentice Winchell, *Editor*









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OPERATING cost of new model guaranteed not to exceed one cent per ton of coal handled.

Was ever a portable conveyor so amazingly economical as this New Scoop Conveyor?

As owners of preceding models heartily testify, the Scoop Conveyor has always been singularly economical to operate.

But owners of the new models insist that the amazing economy of the new model has never been equaled or approached before, even by the fine Scoop Conveyor forerunners.

In fact, owners of the new conveyors are unanimous in proclaiming the 1922 model Scoop Conveyor the greatest conveyor ever produced.

Write for Bulletin No. 51

Portable Machinery Co., Passaic, N. J.

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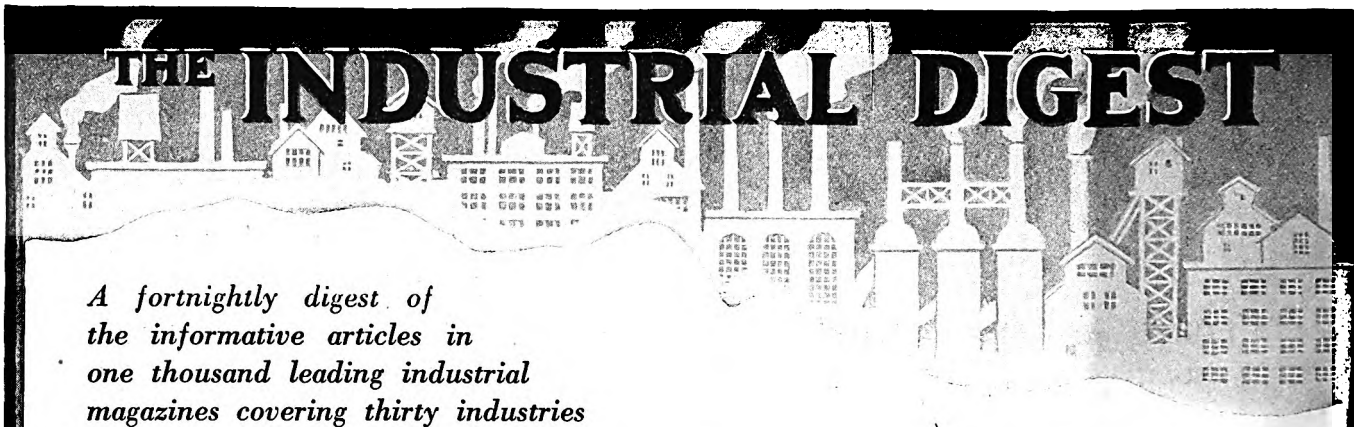
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THE INDUSTRIAL DIGEST

A fortnightly digest of the informative articles in one thousand leading industrial magazines covering thirty industries

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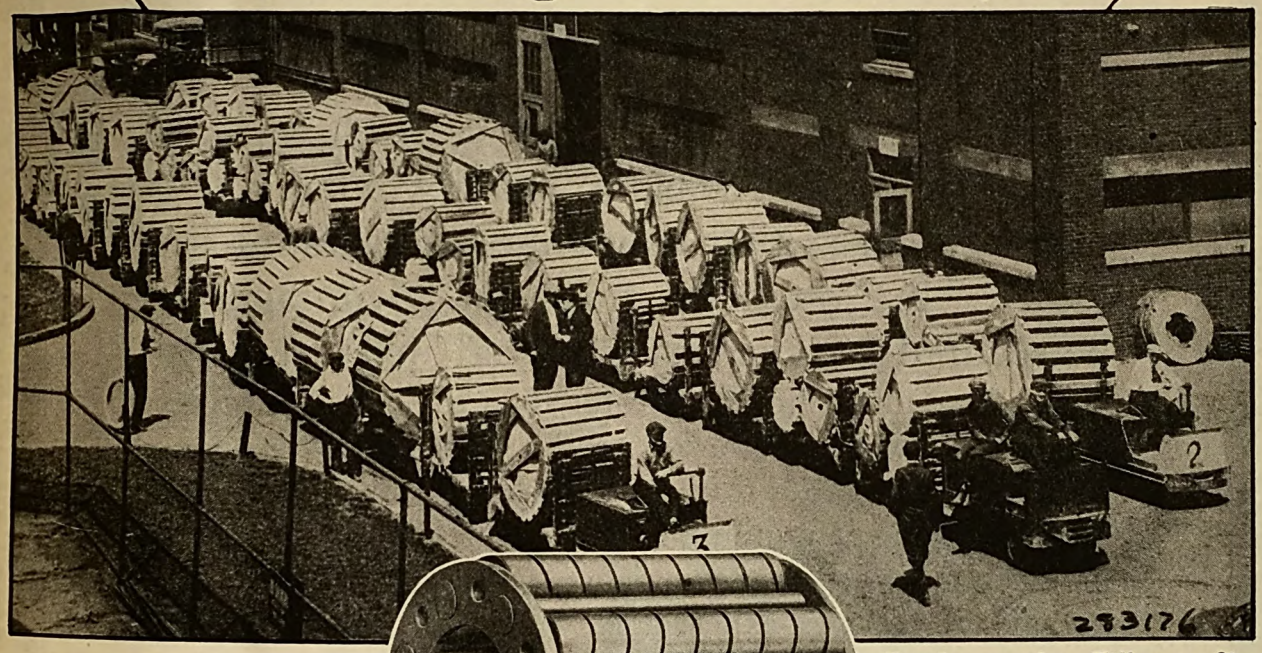
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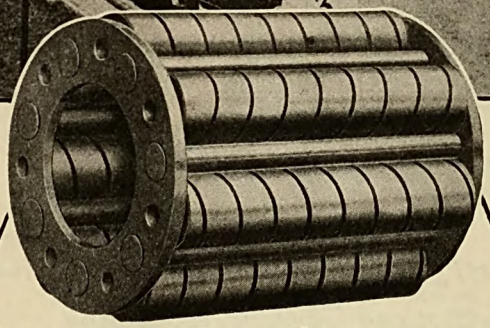
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USE HYATT BEARINGS ON YOUR LINE SHAFTS TOO BULLETIN 127

Reducing Material Inventories

The tendency is to protect yourself on raw materials by purchasing heavily on a rising market such as that which most buyers foresee today. But often the financial advantages to be secured by keeping material inventories at an absolute minimum are greater than the possible saving in anticipating a slight price rise by stocking up for a long period. This matter of reducing material inventories, and keeping them at a minimum, is one which requires special knowledge and special experience. We have acquired that knowledge and that experience.

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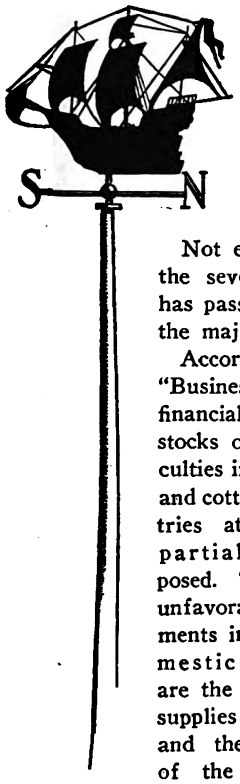


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Vol. 1
No. 23

THE INDUSTRIAL DIGEST

Sept. 16
1922



The Business Weathervane

A Summary of Expert Opinion

Not even the economic losses resulting from the severe strikes through which the country has passed can hold back business this fall, say the majority of authorities.

According to **The Harvard Economic Service:** "Business enters the fall months in a strong financial position, with crop prospects good, stocks of goods generally low, and labor difficulties in the coal and cotton industries at least partially composed. The chief unfavorable elements in the domestic situation are the scanty supplies of coal and the strike of the railroad shopmen. It is obvious that the first of these difficulties will not be immediately removed by the resumption of normal production, but the expansion of operations of bituminous mining means a progressive alleviation of conditions as they exist today. The full effect of the partial railroad strike will become evident only as increasing coal production and the seasonal expansion of traffic, which usually begins about the middle of August, make themselves felt; and it is thus still too early to measure its effect on the general movement of freight. Similar difficulties in the past have never resulted in a reversal of a major advance in business, and neither of these factors presents difficulties of sufficient magnitude to hinder substantially a continuation of the general upward movement now in progress."



(Chicago Tribune)

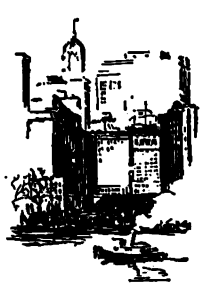
As we must seem to our less fortunate neighbors

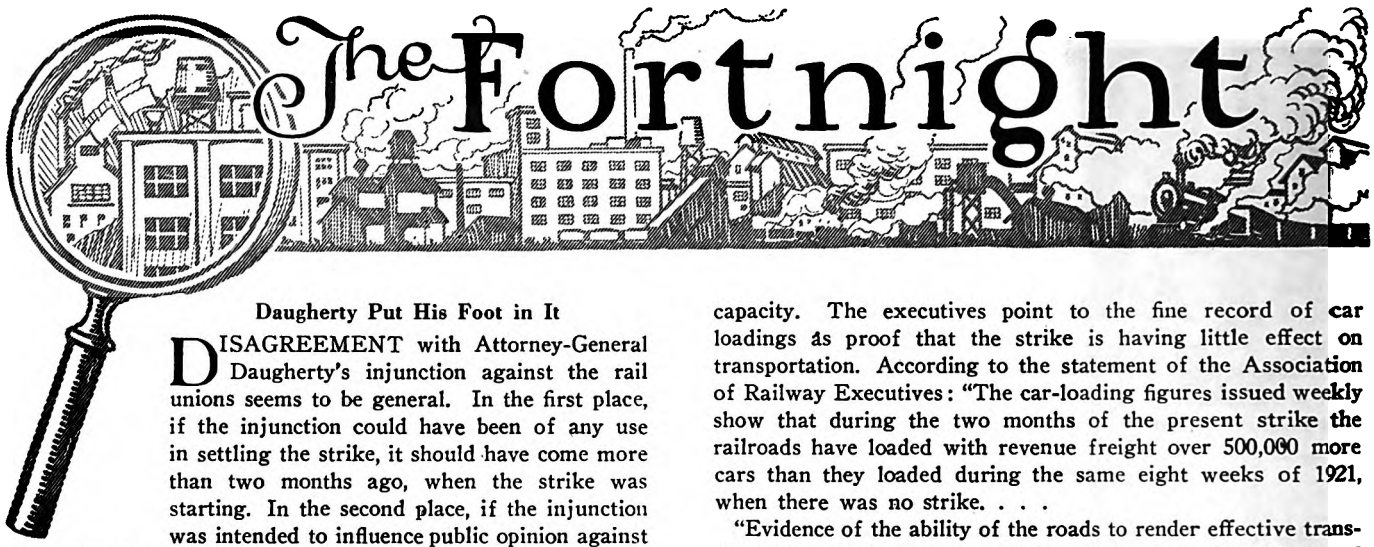
In the opinion of the **Industrial News Survey** "the settlement of the bituminous strike and agreement in the anthracite industry will have removed two major factors in the present industrial unsettlement. Except for removing the danger of enforced plant shutdowns, due to anticipated inability to secure adequate fuel supplies, the adjustment of the coal dispute has, however, had no immediate stimulating effect on business. This is ascribed in part to the fact that the agreements reached are predicated on maintenance of the old high level wage scales. In addition, the widespread shortage of labor which has been reflecting itself in wage increases in numerous instances is taken as forecasting a higher production cost and in turn a higher price level. The general belief is that higher commodity prices will be the rule in the next few months. It should be noted that the present is normally a period of seasonal trade depression.

"Wholesale prices are already reflecting a higher trend, and retail prices are following suit. Nevertheless, manufacturers and distributors are cognizant of a general feeling of opposition to higher prices. The present continues to be a buyer's market and competition for orders is mostly the rule."

The Department of Commerce reports that "the extremely serious labor difficulties through which we are now passing would, under many conditions, have completely demoralized business; instead, real progress continues to be made. There is reason to suppose that the economic losses occasioned by the coal and railroad strikes will make themselves felt for some months to come. Disturbances of this character affecting basic industries cannot take place without having to be paid for in the long run. It is possible that the full force of these losses will be felt more severely in future months when fuel and transportation demands become heavier."

Bradstreet's points out that the "retail trade has felt the intense heat in some sections, but is better in soft-coal mining regions, and industry, with fuel supply slowly improving, is again gathering speed. Transportation is still hobbled, but the railways are handling an immense volume of traffic with surprisingly little friction. Collections are a shade better, but crop reports, especially those as to late corn and the cotton crop as a whole, are very spotted and less satisfactory."





Daugherty Put His Foot in It

DISAGREEMENT with Attorney-General Daugherty's injunction against the rail unions seems to be general. In the first place, if the injunction could have been of any use in settling the strike, it should have come more than two months ago, when the strike was starting. In the second place, if the injunction was intended to influence public opinion against the strikers it failed woefully, because it went too far, according to opinion from all quarters. Third, whereas the rail executives seemed on the point of winning the strike single-handed, without any aid from the Government, this ill-advised injunction has caused a stubborn resistance to any compromise on the part of some labor leaders. The Government has not only been of no use in the present strike: it has been a positive hindrance. To be sure the injunction will in all probability be modified, but since it has had no effect except to stir up antagonism against the Administration, the modification will not matter much.

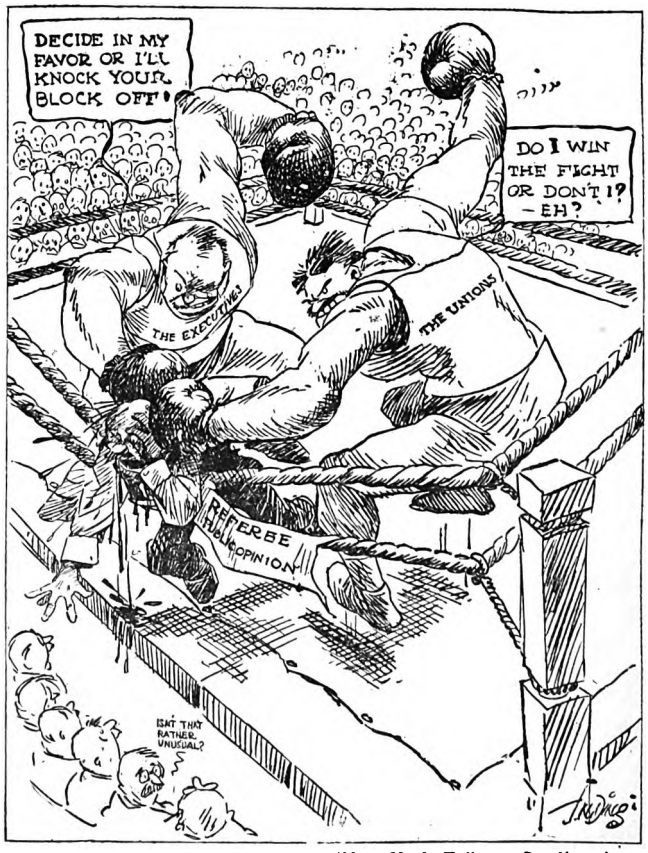
Railroad Strike Broken

THE railroads are apparently winning the strike hands down. On several of the Eastern roads they do not seem to know that there is any strike, so far as smooth operation is concerned. According to the statement of the Association of Railroad Executives, approximately 305,000 employees were engaged in the maintenance of cars and locomotives on September 1, as against about 400,000 in June, 1922—the best evidence that the close of the strike is in sight.

Now, granting that many of these men are not as efficient as the striking shopmen, it must be admitted that the roads will not be seriously hampered if three-fourths of the normal number of shop employees can be put on the job. On the other hand, the Interstate Commerce Commission threw a scare into the roads when it reported that more than half of the locomotives inspected are in need of repairs. Only 4,000 out of more than 70,000 in operation were inspected, but most of these have some sort of defect, according to the report. The roads claim that equipment is in good condition and that new rolling stock coming in will greatly increase their carrying capacity. The executives point to the fine record of car loadings as proof that the strike is having little effect on transportation. According to the statement of the Association of Railway Executives: "The car-loading figures issued weekly show that during the two months of the present strike the railroads have loaded with revenue freight over 500,000 more cars than they loaded during the same eight weeks of 1921, when there was no strike. . . .

"Evidence of the ability of the roads to render effective transportation was furnished on Labor Day, when the volume of business, the greatest in the history of the roads, was handled without friction."

In view of this, strike leaders have practically admitted defeat and are now negotiating for settlements with individual roads. Several of these settlements have been practically agreed upon, according to reliable information, and thus to all intents the strike has been broken. The first tangible agreement was reached at the Chicago conference between representatives of the shopmen and 52 of the 201 Class A railroads. The roads which will take back the men are chiefly in the Southern and Central districts. This agreement seems directed against the existence of the Railway Labor Board, inasmuch as all further disputes are to be referred to a commission composed only of representatives of the carriers and of the men. The agreement makes no specific reference to seniority, but expressly stipulates that the men shall return to work at the wages they received when they struck on July 1.



(New York Tribune Syndicate)

New Method—"Why not decide all bouts by seeing who can knock out the referee?"

Coal Miners Victorious

IN sharp contrast to the rail strike situation comes the victory of the anthracite miners, who have won as definite an advantage as did the bituminous miners. The settlements in both fields were on the basis of old wages, and the strength of the unions remain intact.

Labor has been winning other victories, too—victories sometimes labeled "compromises" by the losers. Thus, in New England, practically all the textile mills have taken back employees at pre-strike wages, and in some cases there have even been increases. The International Paper Mills and the American Window Glass Company—representing the leading concerns in two important industries—have announced wage increases of from 15% to 25%. The 20% wage advance in the steel industries has strengthened

in Perspective

the hand of labor all over the country and, according to all authorities, wage deflation, for the time being at least, has definitely stopped.

Although this will probably mean increased manufacturing cost in most industries, the increased purchasing power which is certain to result from higher wages will mean a greater consumption of goods at more favorable prices.

Increased Purchasing Power Certain

THE excellent crop reports have been strengthened by the certainty that crop prices will be fairly good (see article on page 1538). The purchasing power of the country this fall will be as strong as it was during the first days of the post-war boom. Even the imminent freight tie-up cannot stop fall business from being good—that there will be a freight tie-up is a foregone conclusion, when the facts are taken into consideration. The recent freight embargoes on Eastern roads is only a forerunner of what is coming in October and November.

Nothing New in Congress

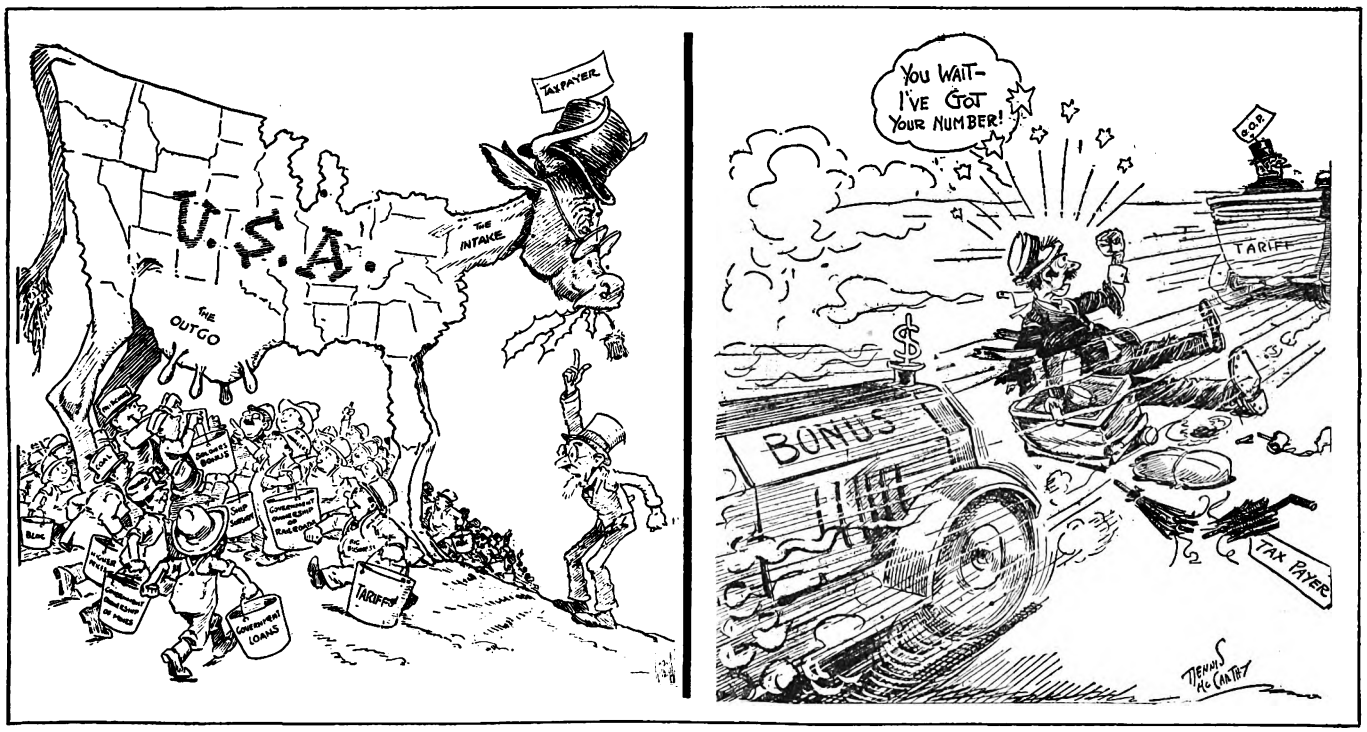
CONGRESS muddles through its business in the same old stodgy manner, agreeing on the tariff schedules as presented in the Senate bill without much difficulty. According to present indications the tariff will become law by October 1, unless the reinstatement of the dye embargo holds up the miserable affair. The House has voted to return the bill to conference in order to strike out the dye embargo, and other changes may result from this action. One feature of the bill seems to have escaped public attention. The House, with American valuation as a basis, evolved a rate schedule which most observers agreed was too high for our own good. The Senate, on the other hand, adopting foreign valuation curiously enough, used this as an excuse to make the rates in their bill even higher than those in the House measure. The Senate rates were adopted practically *in toto* by the conference, *but* a provision enabling the President to change the basis on which duties are to be levied from foreign to American valuation, was included. This means that the bill provides for rates still higher than those listed in the McCumber measure, now generally conceded to be the most dangerous tariff ever proposed.

Steel Production Increasing

THE resumption of coal mining has saved the steel industry from a severe check. The blast furnaces which were down have been started again, and production is now running at approximately 60% of capacity as against 55% in August. Unfilled tonnage of the United States Steel Corporation, as well as of most of the independents, is higher than in the previous month.

Prospects for Building Good

THIS resumption of activity in the iron and steel mills presages an immediate relief to the building trades which have been severely held up on account of lack of structural steel. The building trades have managed to secure some shipments of steel by having the priority orders against building materials rescinded. Building operations in the United States will pick up again and will be higher than normal this winter.

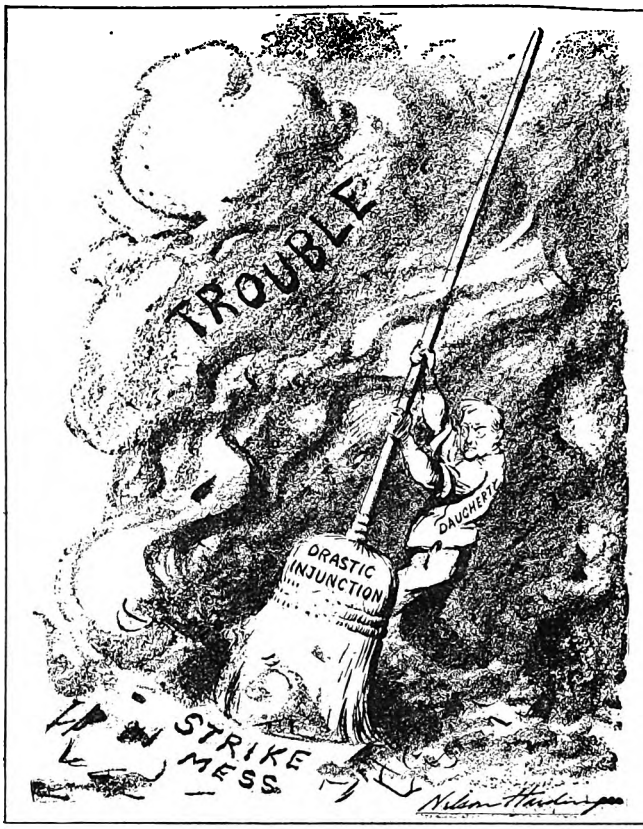


(Columbus Dispatch)

No one seems interested in feeding the poor beast.

(New Orleans Times-Picayune)

The only come-back he's got — at present.



(New York World)

Too sweeping



(New York Call)

A difference in proclamations

Daugherty Fires a Dud

His injunction starts with much noise but fails to affect the strike situation

THE Government staged the star number of its railway strike vaudeville show when Attorney-General Daugherty obtained his injunction against the union leaders. It was a good act—from a vaudeville viewpoint. It made a lot of noise, and all the newspapers gave it extensive publicity.

But when the first gasps at this spectacle of dazzling splendor died, the audience began to realize that seriously it didn't mean much. Only the gallery, where organized labor may, for the purpose of the metaphor, be supposed to sit, took the show to heart; and they greeted the actors with prolonged hisses, and probably won't forget their annoyance until long after Election Day.

Things are going on as if the injunction had not been issued. A group of railroad executives and strike leaders, who believed they were on the road to settlement of the trouble when the injunction startled them into temporary inaction, soon realized that it was not to be taken too seriously, and went ahead with their efforts to end the trouble in their own way. Labor has stopped the outpourings of whispers about a general strike; and even the Administration has permitted it to be hinted that perhaps the injunction will not be enforced as drastically as its text would permit.

* * *

The injunction is similar to that obtained by Attorney-General Olney in Cleveland's second administration to squelch the Pullman strike led by Eugene Debs. It enjoins the union officers and strikers from "interfering with, hindering or obstructing railway companies in the operation of their railroads," and from conspiring or arranging with each other, or with anyone else, to hinder the roads. Specifically it forbids:

(1) Interfering with railway employes at work, or jeering at them.
(2) Loitering about railway property.
(3) Attempting to induce workers to quit, by intimidation, threats or simple arguments.
(4) Picketing: that is, assembling near the places where railroad employes are working in order to urge them to quit.
(5) Causing bodily injury to railway employes, or threatening violence against them or their families.
(6) Encouraging persons to abandon the employ of the railroad or to refrain from entering it "in any manner by letters, printed or other circulars, telegrams, telephones, word of mouth, oral persuasion, or suggestion or through interviews to be published in newspapers."
(7) Using union funds to promote enjoined activities.

Until it became apparent that the injunction was not to be taken with entire seriousness, the rail executives resented it almost as much as did the labor leaders. An executive of an Eastern road, who did not permit his name to be printed, was quoted by the *Journal of Commerce,* New York, as follows:

"The new factor of an injunction against the striking shopmen is now to be faced. There can be no doubt that as a group of citizens, as well as railroad executives, the heads of the carriers will very carefully refrain from criticizing the acts of any officer of the Government.

"What may be expected is that at the proper time and through proper channels the exact condition of the carriers as to the shop forces will be given to the public as their due

right, as will gains in better transportation, and such measure of progress as we make in repairing cars and other equipment. These statements may very likely differ largely from certain information that has been heralded from Government sources, but the comparison will not be made in the spirit of criticism."

Behind this cautious statement, made doubly cautious by its anonymity, resentment against government interference is quite apparent.

The reaction of labor leaders, who called the injunction outrageous and unlawful, and began to talk general strike, is too well known to require detailed reporting here. The comments of the newspapers are more interesting.

Some newspapers approved of the injunction. Mr. Daugherty is reported to have said that 90% of the press comment was favorable. This statement is slightly exaggerated. Yet the Attorney-General has his supporters, among them being the *Indianapolis News:*

"The injunction does nothing more than restrain individuals and organizations from unlawful acts, or from acts which, if not unlawful in themselves, are directed toward the accomplishment of an unlawful object," said this paper "Those who are so fiercely criticizing the action of the court as an invasion of the constitutional rights of those against whom it is directed, would do well to reflect that the people of the United States have certain constitutional rights. Also the Government has some constitutional duties, among them that of seeing that interstate commerce and the transit of the mails are not interfered with. No man, and no organization or combination of men, has the right to hold up the mails or block interstate commerce. That is settled law, and it is in aid of such law that the injunction is invoked.

"The restraining order is only till September 11, when the whole case can be heard. If it be shown that the order is too sweeping it can and will be modified. There is, therefore, no occasion for heated language. The main purpose of the Government is clear enough. It, acting as the representative of the people and their trustee, is endeavoring, for their benefit, and in preservation of their rights, to keep interstate commerce open and the mails in motion."

However, many newspapers, which can scarcely be said to favor labor, deplored the injunction. The *Journal of Commerce,* New York, quotes the paragraphs from the Clayton Act which were intended to restrict the enjoining power of the courts, and adds:

"Whether considered in the light of the above quotation from the Clayton Act, or, with a view to at least one recent decision of the Supreme Court or yet in comparison with what has heretofore been considered the well-advised use of injunctions in labor disputes, the conclusion is inescapable that the court order sought by Attorney-General Daugherty in the railway strike and temporarity issued by the Federal Court in Chicago is drastic in the extreme.

"No unbiased and intelligent observer holds any brief for the striking shopmen. They were both unwise and unjust in ever attempting the strike against the Government and the people of this country.

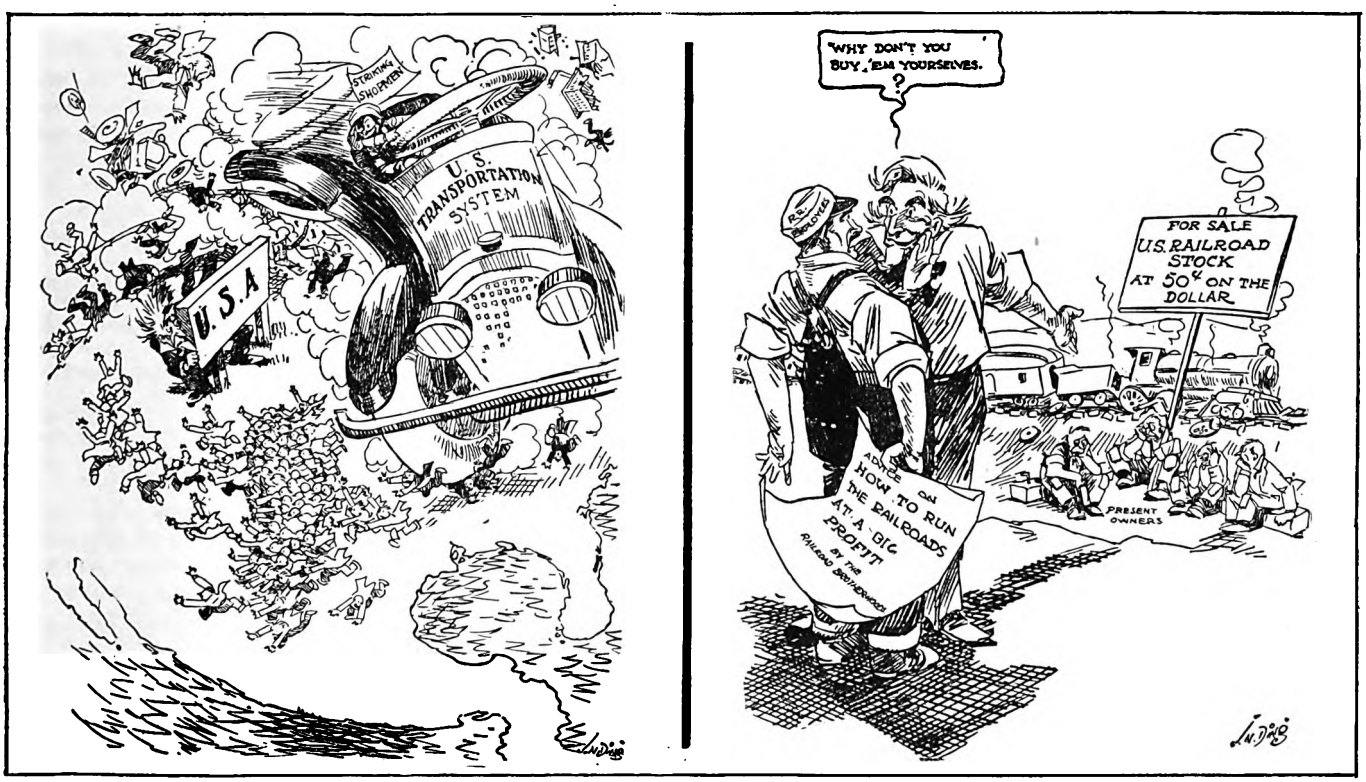
"But is this the way to handle the situation? There is room for reasonable doubt. It would be strange indeed if any good purpose could be served by a temporary order of this sort, doubtful as it is from broader considerations of public policy. Much more likely is it that serious harm may result."

The *New York Times* withholds its approval, and is inclined to ridicule the Administration about its thundering at first and its subsequent change of heart. It quotes a telegram from the Attorney-General to *The New York Herald* in which Mr. Daugherty says the Government would pay no attention to "loose and irresponsible conversation on the part of people who may yet be brought into court." The *Times* adds:

"It is now plain, however, that so great a multitude of loose and irresponsible conversers rose up in protest that the Administration felt it desirable, after a Cabinet meeting, to issue a word of reassurance.

"No one's constitutional liberties are to be taken away from him by the injunction. It will be used only against those who are violating the laws of the land. If this explanation is correct, the wonder deepens why the Attorney-General saw fit to do so much thundering in the index. And it cannot be denied that some of the language used in the injunction gave color to the fears which the White House seeks to quiet. When a person is enjoined from 'in any manner, by letters printed or other circulars, telegrams, telephones, word of mouth, oral persuasion or suggestion, or through interviews to be published in the newspapers, or otherwise in any manner whatsoever,' doing certain things, it certainly looks as if he were condemned thereafter to a life of silent

(Turn to page 1589)



A small boy to be running such a big car

(New York Tribune Syndicate)

Calling his bluff

The General Strike Bugaboo

"An' the general strike 'll get you if you don't --- watch --- out"

THE leaders of the American Federation of Labor apparently have given up the idea of a general strike as a reply to Mr. Daugherty's injunction. They have decided, evidently, to fight this legal action with legal counteraction; and, whatever the opinion of hotheads among the rank and file, the dicta of the leaders will be followed.

A real general strike by the American Federation of Labor would be paralyzing. The Federation's members are a minority of the workers of the country, but they are an influential minority and they work at fundamental trades. If they were united in their strike with the railway brotherhoods the country would simply have to shut up business until the strike was settled. The worst of it would be the encouragement which such a strike would offer to the I. W. W. and similar organizations, which would join the suspension of work and possibly add to it a generous contribution of lawlessness and violence.

Such a contingency is extremely unlikely. The speed with which the talk of a general strike died down is proof, if proof were needed, that the American Federation of Labor will require a great deal of pushing before it will take such drastic action. Its leaders are conservative men, slow to countenance extreme action. It is surprising, indeed, that Mr. Gompers even permitted the words "general strike" to escape his lips. His utterance can be understood only if it is considered a clever piece of bluff, and a subtly effective bit of propaganda.

Mr. Gompers' utterance was explained, and the situation in regard to a general strike elucidated, in an article by John J. Leary, Jr., of *The World,* New York. Mr. Leary, who knows as much about the American Federation of Labor as any newspaperman in the United States said:

"The announcement by Samuel Gompers of his intention of laying proposals for a general strike before the Executive Council of the American Federation of Labor does not mean that Gompers has or that the Federation is about to abandon its historic opposition to this type of strike.

"Demands for such a strike have, Mr. Gompers declared, poured in on him in greater volume since the rail strike began than at any time in his more than 40 years as a labor official.

"For the most part these demands come from central bodies which make up the bulk of the 'lunatic fringe' at every Federation convention. More than any other section of the movement, these bodies are radical and vocal, but they are, none the less, representative of sentiment in their communities, and the fact that to a greater extent than ever before they have been demanding general action is held by Mr. Gompers to indicate the frame of mind of a large portion of the working public.

"The demands of these bodies will be submitted to the council 'as is,' that is to say without recommendations or findings, leaving it to the council to decide what action, if any, can or should be taken. That the council will not recommend a general strike is a foregone conclusion.

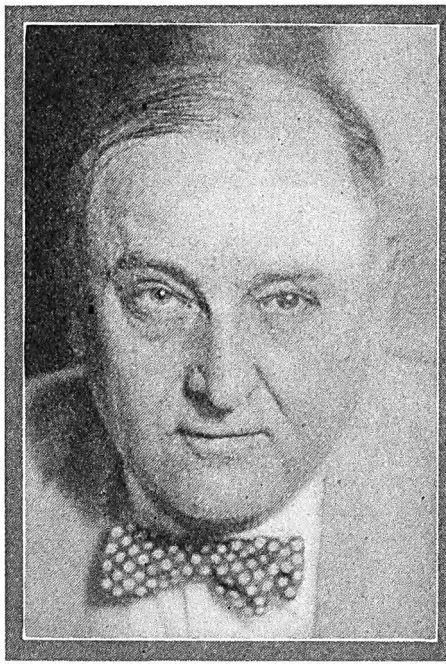
"The farthest the council is likely to go, and even that is doubtful, would be to call a general conference of representatives of the 120 international unions making up the Federation.

"Even such a conference could only advise, and its advice would bind nobody, for each of the subsidiary unions is guaranteed autonomy. It is also a fact that were such a conference unanimous in advising a general strike, it would be weeks before the laws of many internationals could be complied with and the desired result secured. With any such program, many, if not all, of the larger unions, other than possibly those involved in the rail strike, would be in disagreement.

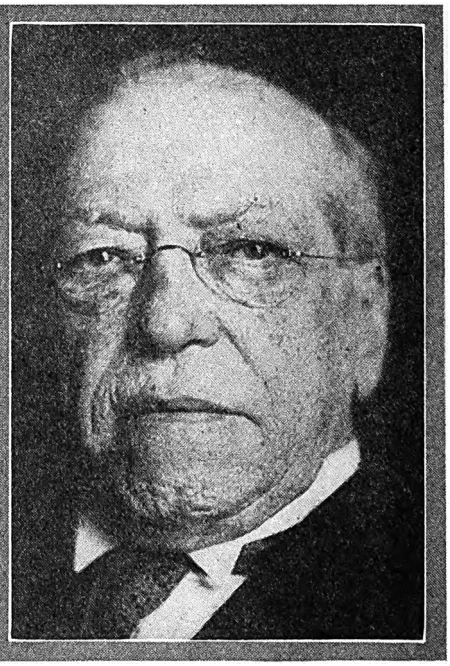
"Included in this list would be the miners, who, well-informed persons declare, will stick to digging coal now that most of their number are back on the job, and the 'big four' brotherhoods, which are on record as opposing any spread of the strike. Until these quit, it would be difficult to convince men of other trades that laying down their tools would help much."

In view of this, it is not hard to understand why labor, instead of striking against the injunction, is fighting it in the courts. James F. Noonan and Charles P. Ford, officers of the International Brotherhood of Electrical Workers, one of the striking shop unions, have applied to the Supreme Court of the District of Columbia for an order restraining the District authorities from carrying out the Chicago injunction obtained by Mr. Daugherty. Thus the fight of labor as a whole against an injunction which it believes threatens its fundamental rights becomes legal instead of industrial.

Possibly the Union leaders' decision not to call a general strike in this country may have been influenced by the disastrous results to the strikers in Germany and England when they attempted a complete tieup of industry in those countries by inducing the workmen to join a general walk out.



(© International)



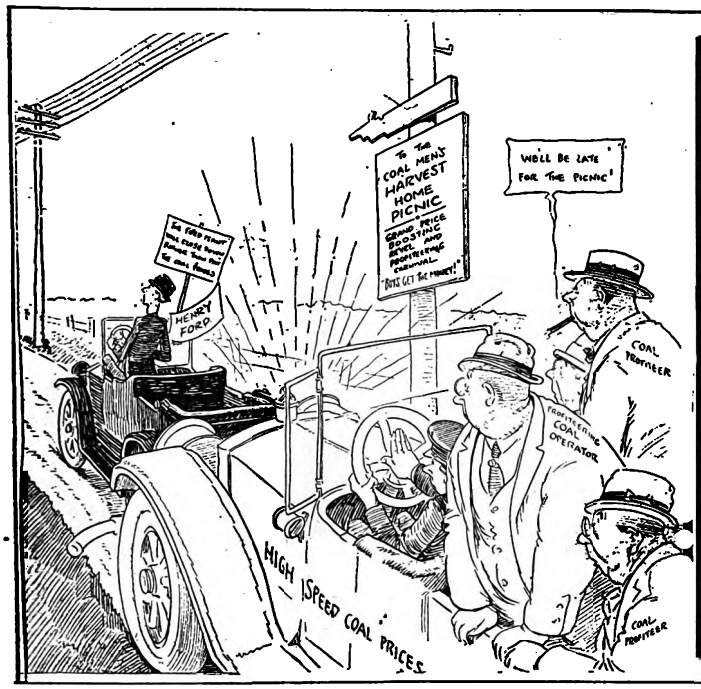
(© Underwood)

Central figures in the strike dispute: Harry Daugherty, U. S. Attorney-General (left), and Samuel Gompers, President, American Federation of Labor.

"So long and to the extent that I can speak for the Government of the United States I will use the power of the Government within my control to prevent the labor unions of the country from destroying the open shop."—DAUGHERTY.

"This injunction is most outrageous and is a process for the manufacture of radicalism and bolshevism. . . . The Government, through its Attorney-General, has stirred up a hornet's nest."

—GOMPERS.



(Columbus Dispatch)

Dawg gone those Fords!



(Chicago Tribune)

Puzzle: Find the loser.

Coal Miners Back at Work

And everything is settled between the strikers and the operators —until next year's strike comes 'round

AFTER 155 days of idleness the hard coal strike has come to an end. The agreement ending the present strike extends the contracts which were in force prior to April 1 through to September 1, 1923. At that time a new wage scale will be taken up.

The settlement is described as a compromise. From the miner's standpoint it is a very successful "compromise." They retained everything they had last March when they walked out. At that time they asked, naturally enough, for a wage increase, but that demand was made merely for trading purposes and they never intended to force the issue. The retention of the wartime wage scale and the defeat of all proposals tending toward compulsory operation means that the miners have won in the hard coal regions precisely as they did in the soft coal fields.

In the bituminous districts the agreement is to end next March 31. In the anthracite field arrangements have been made for a continuance of production while the next wage battle is being fought. Summed up, the anthracite situation is this: We will have to get along with some 30,000,000 tons less hard coal this winter. This will require more efficient burning of fuel, and of course, the introduction of substitute fuels. It is estimated that most of the difference will be made up by the consumption of wood and coke for domestic purposes. So far as soft coal goes there will be plenty for industrial requirements, but the transportation problem will make it problematical as to whether the individual consumer can keep a sufficient supply on hand. The roads have attempted to speed up coal shipments, and have been successful to some extent, but they cannot possibly distribute coal *and other commodities* properly. If coal shipments are handled expeditiously crop shipments and regular freight will undoubtedly be delayed. The rolling stock situation is undeniably serious.

So far as the consuming public goes two great things have come from the strike. The first is higher prices. Neither the operators nor the miners will lose anything in the long run.

The first shipments of anthracite reaching New York after the resumption of mining were billed at $9.50 at the mines or exactly $1 a ton higher than the price prevailing before the strike. The retail price will, of course, be increased more than $1 a ton. The same thing holds true, though to a lesser degree, in the bituminous situation.

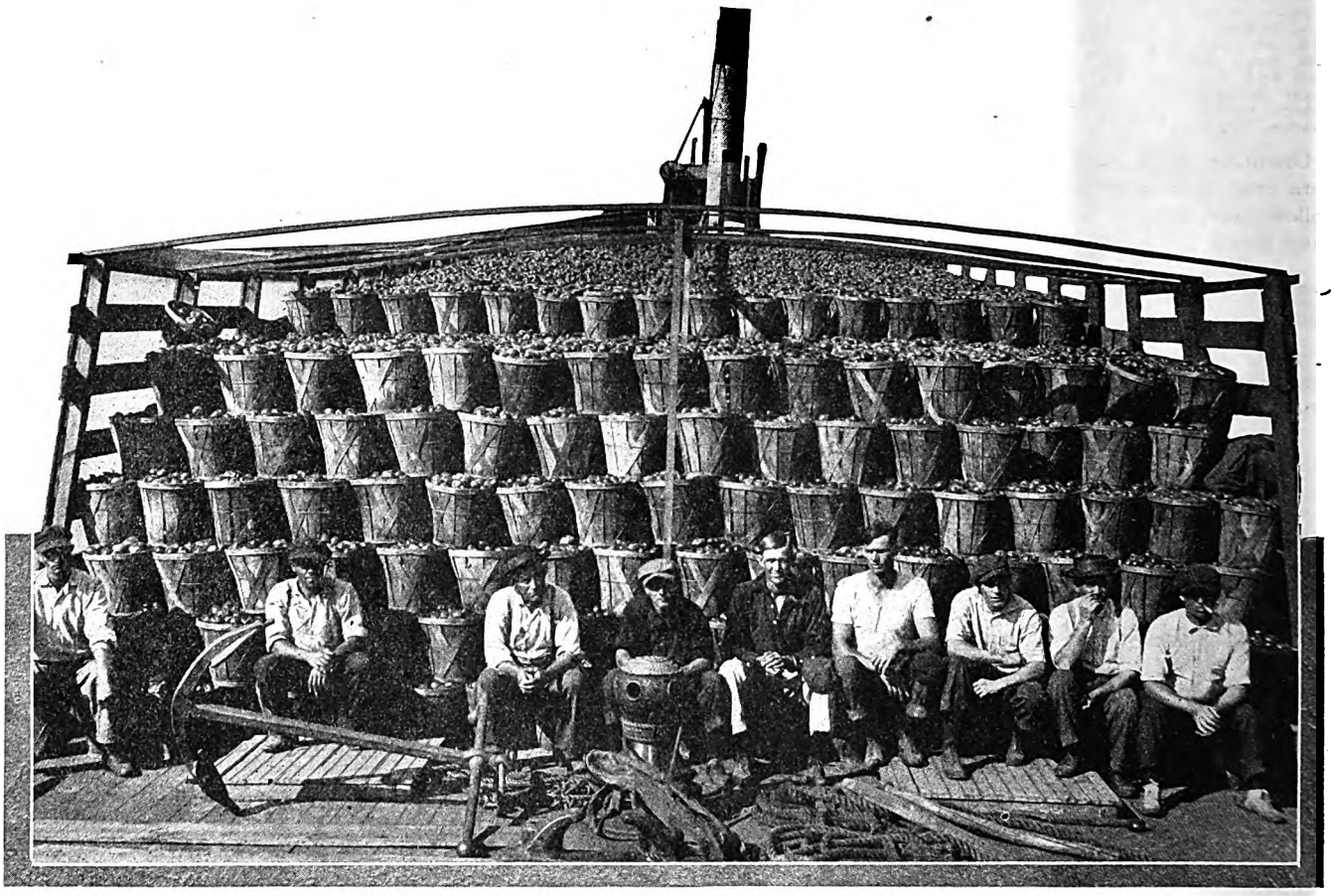
The second thing which has come out of the strike is the appointment of numerous investigating commissions: The passage of the Borah Bill by Congress, and the appointment of investigating commissions in the bituminous and anthracite fields. Thus a searching national investigation is practically insured. And since all hope of checking further coal strikes rests upon a general knowledge of the fundamental weaknesses of our present mining system, perhaps the ill wind has blown some good after all.

Labor Shortage in Building Trade

THE Chicago labor situation in the building trades has shown no great changes as yet. A let up in the intense shortage of bricklayers is expected within the month, but labor in the plastering and other finishing trades will probably remain scarce till late in the season. Active bidding for mechanics still continues.

Crop Prices Will Be High

And consequently the farmer will be a good customer during the fall and winter months



A tomato joyride. Barge loaded to capacity en route to a cannery in southern New York.

IT now appears that the crops this year will not only be large, but also will bring good prices to the farmers. The aggregate value of this year's important farm products, according to the September 1 estimate of the Department of Agriculture, will be $6,600,000,000, which is $1,250,000,000 more than their value last year.

This high figure is possible because comparatively high prices of farm commodities have remained with us—together with the large crops. According to the Department of Commerce's *Survey of Current Business,* the present index number of crop prices is 118, compared with an index of 107 a year ago. The livestock price index is 119, compared with 107 in 1921. These increases are not remarkably large, but they are substantial. Last year the crop was small and the prices were low; this year the crop will be large and the prices a little higher.

The general industrial situation will benefit because of the increased purchasing power with which the farmer will be endowed. Bad conditions in the rural districts are said to have been one of the most important factors in the unfortunate industrial situation in 1921; therefore a reversal of form ought to help matters. In the opinon of the *Harvard Economic Service,* the marketing of the crops *"will further accelerate the improvement in business which has been in progress since the end of January."*

The Department of Agriculture predicts that three crops—corn, cotton and hay—will exceed $1,000,000,000 each in value, their aggregate comprising more than one-half of the value of all the important crops. Corn will be worth approximately $496,000,000 more; cotton, $389,000,000; oats, $83,000,000; apples, $64,000,0000; hay (tame), $47,000,000; peaches, $36,000,000; and the value of tobacco, rice and cottonseed crops are expected to exceed their last year's value.

The calculated value of the crops will be:

Wheat	$ 720,600,000
Corn	1,801,900,000
Oats	404,100,000
Barley	88,500,000
Buckwheat	11,600,000
Rye	50,300,000
Potatoes	385,400,000
Sweet potatoes	116,200,000
Hay (tame)	1,037,600,000
Hay (wild)	122,600,000
Cotton (exclusive of seed)	1,064,400,000
Apples	227,200,000
Peaches	88,100,000
Peanuts	30,400,000
Flaxseed	22,100,000
Beans	49,600,000

Reduction of 142,000,000 bushels during the last month in this year's prospective corn crop was shown in the forecast of the crop at 2,875,000,000 bushels. The crop was reported to have deteriorated considerably in the Central and Eastern States since mid-August and to have had a severe setback in Missouri, Kansas and Nebraska from excessive heat and lack of moisture.

Other crops generally showed increases in prospective production, although there were a few slight declines. Production of other crops is estimated as follows, compared with the August estimate and with the final estimate of 1921:

	Sept., 1922	Aug., 1922	Final, 1921
Wheat, bushels	818,000,000	805,000,000	795,000,000
Barley, bushels	194,000,000	192,000,000	151,000,000
Buckwheat, bushels	13,500,000	13,800,000	14,100,000
White potatoes, bushels	438,000,000	440,000,000	347,000,000
Sweet potatoes, bushels	108,000,000	112,000,000	98,700,000
Tobacco, pounds	1,353,000,000	1,425,000,000	1,075,000,000
Flax, bushels	11,700,000	11,400,000	8,100,000
Rice, bushels	38,800,000	38,700,000	36,500,000
Hay, tame, tons	92,900,000	93,100,000	81,600,000
Hay, wild, tons	15,800,000	17,200,000	15,200,000
Sugar beets, tons	5,260,000	5,080,000	7,780,000
Apples, bushels	207,000,000	262,000,000	98,100,000
Peaches, bushels	55,600,000	56,000,000	32,700,000

Condition, percentage, acreage and indicated yield for the corn crop, as now estimated by the Government, compare as follows with the estimates of the preceding month and of the same month last year:

	Sept. 1, 1922	Aug. 1, 1922	Sept. 1, 1921
Condition	78.6	85.6	85.1
Acreage	103,234,000	103,234,000	108,901,000
Indicated crop, bushels	2,875,000,000	3,017,000,000	3,186,000,000

In the following table comparisons for a longer series of years are given, the figures of acreage and yield for years prior to 1922 being those of the actual harvest:

	Condition	Acreage	Crop, bushels
1922	78.6	103,234,000	2,875,000,000
1921	85.1	103,850,000	3,081,251,000
1920	86.4	104,601,000	3,232,367,000
1919	80.0	102,075,000	2,816,318,000
1918	67.4	107,494,000	2,502,665,000
1917	76.7	119,755,000	3,065,233,000
1916	71.3	105,954,000	2,566,927,000
1915	79.5	108,321,000	2,994,793,000
1914	71.7	103,435,000	2,672,804,000
1913	65.1	105,820,000	2,446,988,000
1912	82.1	107,083,000	3,124,746,000

Condition, acreage and indicated yield for the spring wheat crop, as estimated by the Government in its report on that crop for the season of 1922, compare as follows with the estimates of the preceding month and the same month last year:

	Sept. 1, 1922	Aug. 1, 1922	Sept. 1, 1921
Condition	80.1	80.4	62.5
Acreage	18,639,000	18,639,000	18,025,000
Crop, bushels	277,000,000	263,000,000	210,000,000

Spring wheat conditions by States are given by the Department as follows:

	Sept. 1, 1922	Sept. 1, 1921	Sept. 1, 1920	Sept. 1, 1919
Minnesota	80	58	59	48
North Dakota	87	56	63	45
South Dakota	85	56	53	50
Montana	80	58	72	21
Washington	48	75	59	63

Estimated production of spring wheat compares as follows by States, in thousands of bushels:

	September, 1922	August, 1922	Actual, 1921
Minnesota	32,629	31,194	23,655
North Dakota	113,044	103,153	73,264
South Dakota	37,155	36,140	24,930
Montana	36,002	35,236	23,940
Washington	12,112	12,330	17,205

In the following table comparisons for a longer series of years are given, the figures of acreage and yield for years prior to 1922 being those of the actual harvest:

	Condition	Acreage	Crop, bushels
1922	80.1	18,639,000	277,000,000
1921	62.5	19,706,000	207,861,000
1920	64.1	19,419,000	222,430,000
1919	48.5	23,238,000	207,602,000
1918	82.1	22,406,000	356,339,000
1917	71.2	18,511,000	223,754,000
1916	48.6	17,956,000	155,765,000
1915	94.6	19,445,000	351,854,000
1914	68.0	17,533,000	206,027,000
1913	75.3	18,485,000	239,819,000
1912	90.8	19,243,000	330,348,000

Spring wheat condition estimates by months for a series of years have been as follows:

	June	July	August	September
1922	90.7	83.7	80.4	80.1
1921	93.4	80.8	66.6	62.5
1920	89.1	88.0	73.4	64.1
1919	91.2	80.0	53.9	48.5
1918	95.2	86.1	79.6	82.1
1917	91.6	83.6	68.7	71.2

Taking the spring wheat estimated yield and adding to it the season's winter wheat crop as estimated by the Government a month ago, the year's total wheat indication is as follows, compared with the estimates of the preceding month and the same month last year:

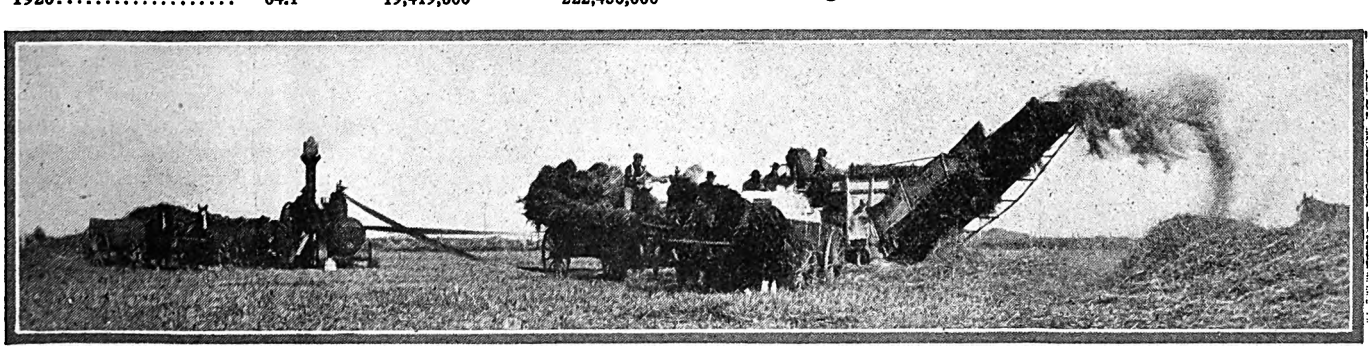
	Sept. 1, 1922	Aug. 1, 1922	Sept. 1, 1921
Acreage	56,770,000	56,770,000	56,744,000
Crop, bushels	818,000,000	803,000,00	754,000,000

World production of wheat this year, excluding Russia and Mexico, is estimated by the United States Department of Agriculture at 3,019,526,000 bushels, based on actual estimates from reporting countries and estimates based on condition reports. Production in 1921 was 3,059,596,000 bushels, and for the pre-war 1909-13 average 2,890,353,000 bushels.

Decreases occur in nearly all European countries. Total European production is estimated at 1,100,991,000 bushels, compared with 1,239,256,000 bushels in 1921, and a pre-war 1909-13 average of 1,275,157,000 bushels. British India and Japan will have 392,847,000 bushels, compared with 282,094,000 bushels last year, and 375,827,000 bushels, the pre-war average. Both Canada and the United States show increased production over last year, with a combined estimated output of 1,125,-968,000 bushels, compared with 1,095,751,000 bushels in 1921, and 883,810,000 bushels, the 1909-13 pre-war average.

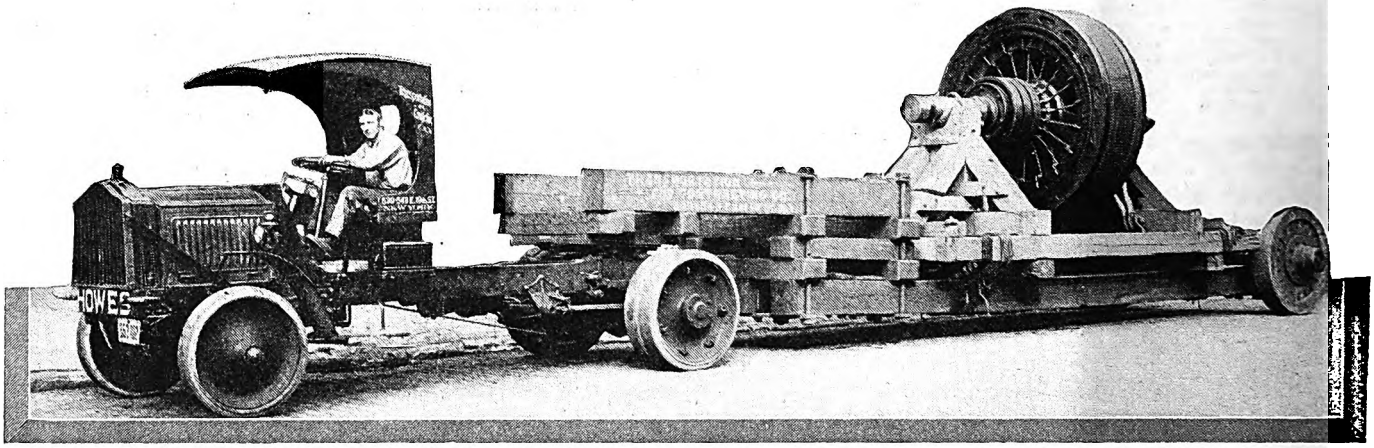
Russia reports favorable crop conditions and, according to advices from all sources, will be able to feed herself this year. Last year Russia imported wheat. Production figures for Mexico are not available, but last year 5,089,000 bushels were produced, according to an unofficial estimate, compared with the 1909-13 average of 9,995,000 bushels. For Africa a total production of 57,587,000 bushels is estimated, compared with 81,398,000 bushels in 1921, and with the pre-war 1909-13 average of 73,134,000 bushels.

Total production in the Northern Hemisphere, according to actual estimates from reporting countries, will be 2,200,650,000 bushels, compared with 2,143,979,000 bushels in 1921, and with 2,020,276,000 bushels, the pre-war average. Estimates made by the United States Department of Agriculture based on condition reports bring this total up to 2,677,393,000 bushels, compared with 2,697,499,000 bushels in 1921, and with a pre-war average of 2,607,928,000 bushels. Total production in the Southern Hemisphere for the last harvest season is estimated at 342,133,000 bushels, compared with 362,097,000 bushels in 1921, and with 282,425,000 bushels, the 1909-13 pre-war average.



Our New Colossus of Roads

How the development of the motor truck has changed transportation problems and how it may alter the industrial map of the future



The spirit of automotive transportation is exemplified in this illustration. For short hauls the motor truck has surpassed all other known means of transportation. It can carry large loads at comparatively small expense and get there first

IF you want to get a vivid impression of the size and importance of the automotive industry, stand by the side of the Boston Post Road, which connects New York City with Boston and way cities, and watch the motor traffic. Silent passenger cars will speed past in a constant procession, so fast and so many that you will grow dizzy if you try to watch them closely. Heavy motor trucks will be interspersed among them, carried in the stream like logs in a river. Men, women and commodities—apples, brick, plaster, iron, wire, lumber, oil, poultry, silks, trunks and vegetables—will roll before you, drawn by humming gasoline engines to places where there is need for them.

Behind this and similar scenes on roads all over the country, is the automotive industry of the United States, which has grown great by supplying the vehicles needed for road transportation. Nearly $1,500,000,000 is invested in the 407 factories which make motor cars and trucks. Their products are distributed and kept in condition by 78,739 dealers, repairmen and garage owners.

Right now, when the weaknesses of our railroad system are being made conspicuous by a prolonged strike and the prospect of congestion, it is timely to take stock of the situation in motor transportation, the only other practical means of carrying goods and persons overland about the country. What is the place of the motor vehicle in our transportation system? To what extent can motor transportation supplement locomotive haulage? What is the condition of the industry which supplies motor transportation?

* * *

The place of the automobile in the business of passenger transportation is quite obvious. It is thoroughly established as the best possible vehicle for the short trips which are a part of daily life. One significant observation is to be made on this subject: Automobiles are no longer called "pleasure cars" as often as they used to be. Passenger automobiles are used by professional men to carry them to their clients and patients; by housewives to do marketing; by business men for a hundred purposes. In the past few years they have ceased to be toys of the rich, and have become parts of the commonplace life of the country.

The development of the passenger automobile—especially the cheap car—is having an important effect on the real estate market. It is making possible the growth of suburbs further away from cities, and further away from railroads, than has formerly been considered possible. Roger W. Babson is greatly impressed with the importance of this. He has advised the subscribers to his statistical service to invest in suburban real estate now, simply because automobiles are plentiful. People, including workingmen, are getting tired of paying high city rents, he points out, and if they can invest in a cheap country house and a cheap car to carry them to work or to the railroad they will not stay in the congested districts.

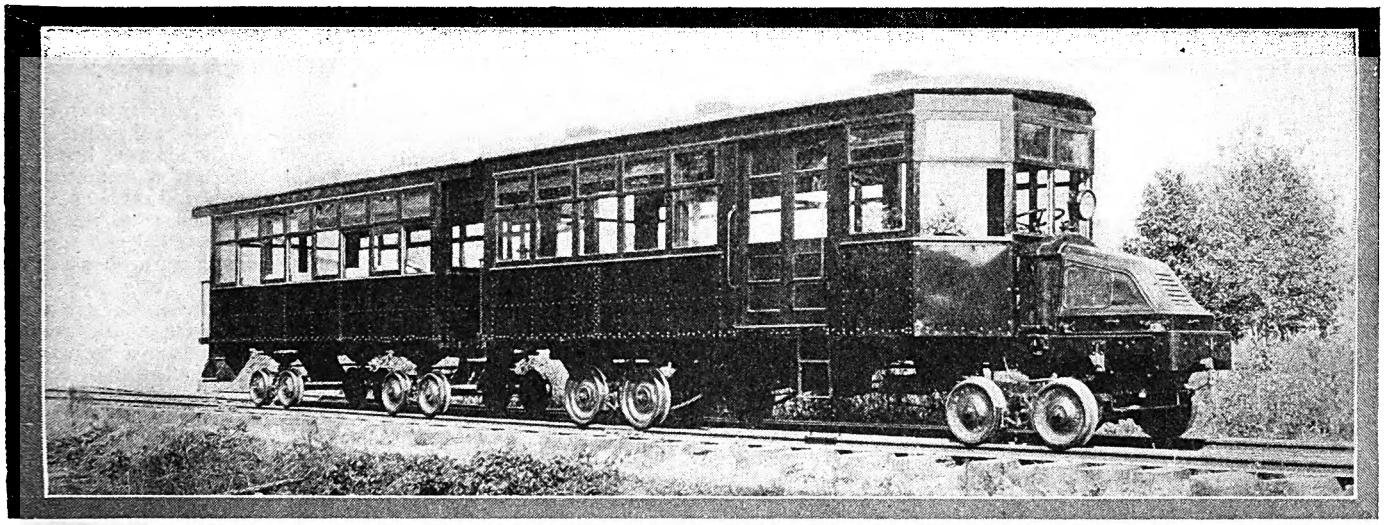
From the viewpoint of industry in general, however, the passenger car is not nearly as important as the truck. Truck manufacturers now look forward to doing a bigger business than they have ever done before. The use of trucks is growing in all fields.

A Sane View of Motor Truck Transport

THERE has been much loose talk about the possibility of the motor truck supplanting the railroad. Some enthusiastic persons give the impression that they think motor trucks could haul all the passengers and freight of the country. Of course that is nonsense. For long hauls the railroads are supreme, and probably will continue so, even if they fall into far worse condition than they are in at present. But for short hauls the motor truck is important. Even when the railroads are running well, it is often cheaper to ship by truck for a short distance.

The motor bus is a form of truck used for passenger traffic for which a great future is predicted. Buses are used for rapid transit in 108 cities, and the list is growing. In many cases they are competitors of electric street railways, which many persons (including the mayor of New York City) think they will supplant. But they are more important as feeders for such railways. Recognizing this, no less than 26 electric roads have established bus lines which they operate themselves, as feeders for the cars which they operate over their main routes.

Still other railroads use motor buses with flanged wheels for operation on tracks over short routes. The New Mexico



A four-wheel drive car designed by railroad men of North Carolina which has given exceptional service. The designers claim its efficiency is not impaired by snow and ice, a quality they did not find in converted motor trucks.

Central R. R. runs a flanged-wheel motor bus line over 116 miles of track, and the New York, New Haven and Hartford operates a 104-mile route. Twenty-five other roads run shorter lines.

The railroad's point of view in this matter is expressed as follows by the *Railway Review:*

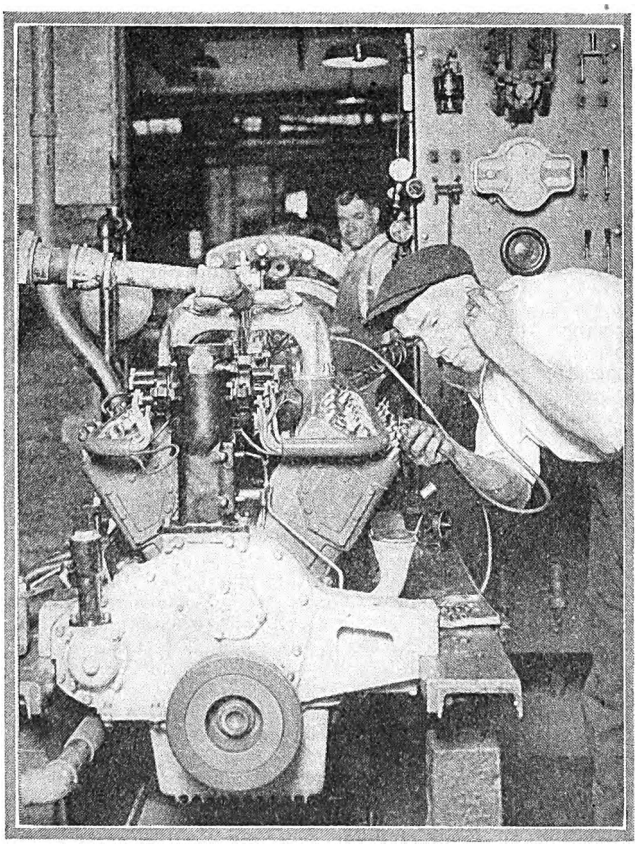
"Light local passenger service is undoubtedly the most expensive luxury in proportion to the returns that the railways can offer the public. Whether it be the daily branch life "turn-around" or the main line "short-dog" that must be maintained at the mandate of a State commission, it results usually in a very meagre return, while the expense of operation is often considerable.

"This is particularly true where a steam locomotive is used to haul a couple of passenger coaches. Under these circumstances it is seldom that the fuel consumption is less than 400 lbs. of coal per car mile, while a full passenger and engine crew must be employed. Locomotives retained in this class of service are invariably old and decrepit so that the cost of their maintenance usually runs high. Branch lines are seldom built for their passenger traffic possibilities, but once constructed, passenger service is demanded and must be constantly operated even after the original freight prospects may have become exhausted, so that these branch lines frequently transpire into white elephants on the hands of the owning railroads.

"Some years ago large gasoline driven cars entered the market and, subsequently, gasoline and electric cars were substituted for light passenger trains on many railways. Admirable and elegant in construction as these cars proved to be, their first cost in many instances approached that of a new locomotive and the intricacies of their mechanism often demanded a large share of official attention from the chief electrical engineer down. Faced with these discouraging circumstances in the operation of light passenger service, it has been particularly galling to railway management to observe the automobile truck and bus thriving on the very traffic that had caused the railways an actual loss.

"This situation has naturally been aggravated in the minds of railway managers by the fact that the automobile is being run over a road built and maintained by the taxpayers which, of course, includes the railways in large measure. It is as futile, however, to argue against the inroads which the automobile has made upon rail traffic or to suggest the prohibition of this automobile traffic as to remonstrate against the rapid spread of a forest fire.

"The most effective policy is to fight fire with fire. A very plausible remedy is suggested in the form of a rail motor bus. Following closely in detail the main features that are responsible for the successful performance of the automobile truck, it may be assumed a rail bus can be constructed which embodies the same elements of simplicity in construction, reliability in performance, flexibility in operation, light weight and low first cost. It is possible that if the rail motor bus is to be successfully operated as a substitute for the light passenger train in main line service as well as on branch lines, that a maximum speed of more than 30 miles per hour should be attainable, but it is believed that, if designed to meet various local conditions, the field for a light gasoline rail car patterned after the automobile affords many interesting possibilities in the direction of economy and better service."



(© Galloway)

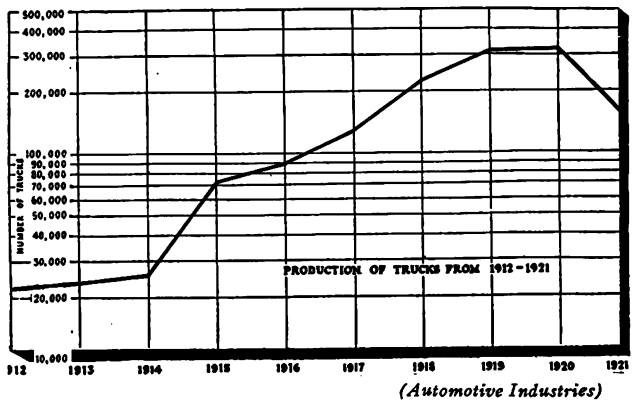
Perfection is required of motors. The automobile doctor uses a stethoscope to detect the slightest friction in the motor before allowing it to be installed in the car.

Enlightened railroad men see the importance of motor truck transportation, and welcome it instead of fearing it. Elisha Lee, vice-president of the Pennsylvania system, says:

"To the extent to which the motor cars are likely to take over the short-haul freight traffic, the railroads will probably be immediately benefited financially, because short-haul business is becoming increasingly unremunerative on account of the high proportion of terminal costs which it must sustain. Altogether, I am not afraid of motor cars and aeroplanes making railroads obsolete."

And C. A. Phelan, general manager of the Missouri & North Arkansas R. R., says:

"There is no question but what the motor truck is a great



(Automotive Industries)

Production of trucks in U. S. since 1912.

asset in the handling of freight to and from the railroads to the interior country, and there is an opportunity for considerable development along such lines in this country."

This is the picture of the future of truck transportation: a network of lines leading from railway stations and terminals, carrying freight to the roads, and serving interior points which the roads themselves cannot reach; plus a great number of short motor express routes carrying goods more economically than the railroads can haul them. The National Automobile Chamber of Commerce estimates that there are about 1500 motor express lines in operation now in various parts of the country, of which 984 are listed at the N. A. C. C. offices.

A. J. Brosseau, president of the International Motor Co., recently told the Merchants' Association of Greater New York how the motor truck reached its present place in our transportation system, and how it will continue as an aid to the railways:

"It is only within five or six years that the motor truck has been an important element in transportation," he said. "It owes its present important position in transportation to the railroads which were unable to handle the enormous volume of freight traffic moving during the boom of 1917 to 1920.

"When the railroads became congested and declared embargoes and were blockaded for weeks at a time, manufacturers were faced with the alternative of shutting down for want of raw materials and supplies, or finding another means of transportation. They turned to the motor truck as a temporary substitute. It served them so well that they have continued to use it since the railroads have succeeded in clearing up the traffic jam after the present business depression developed a year ago. Merchants and farmers were also compelled to use the motor truck to move their merchandise and foodstuffs, and they also have continued to avail themselves of motor truck transportation over the highways.

"As you all know business has been poor for the last year, and the railroads can now handle all the traffic that offers. We are asked if the railroads are now helped by the motor truck. My answer is 'Yes,' for business is going to be good in the near future, and when it is the railroads will again be unable to handle the traffic. We shall then have delayed shipments, embargoes, blockades, and the truck will again save the situation for the railroads and for the public. It may also save the railroads from the fate they so narrowly escaped during the last traffic jam—permanent government ownership."

Mr. Brosseau quoted W. J. L. Banham, a traffic expert, as follows on the economics of the use of the motor truck:

"Users of motor trucks should consider to what extent they can be operated in cooperation with the railroads for short-haul freight movement. The principles involved are: First, service; second, cost.

"There seems to be no question at the present time that the carrying of less than carload shipments to short-haul points by the rail carriers is not only expensive to the shipper, but is also unprofitable to the carriers. Until recently it seemed to be almost necessary for the shippers to use the rail carriers for the movement of their less than carload shipments to nearby points, regardless of expense and delay, as there did not seem to be any organized effort made by the motor truck operators to take care of this class of freight.

"It is extremely difficult for carriers to figure cost of transportation of package freight hauled short distances and particularly to such points at which they do not have a through car movement. The expense of transferring the less than carload shipments one or more times when moving within 50 miles of the receiving station, and the additional expense caused by the delay of equipment, has been recognized by the Government, with the result that the U. S. Railroad Administration during the war ruled that freight destined within a certain radius would not be handled by the rail carriers. It was necessary, therefore, for the shippers to find other means of transporting this class of freight. Motor truck transportation, while still in its infancy at the present time, pointed a way to the shippers whereby their less than carload shipments could be hanlled not only more promptly, but at a considerable saving both to the shipper and to the receiver of freight alike.

"While it is true that it is almost impossible for the carriers to figure the exact cost of handling short-haul freight, it is equally as difficult for the shippers to ascertain the cost of transporting similar freight. The question of cost brings me to the first part of my subject, and in order to make it clear as to what I mean by costs and what these costs cover, I am going to refer to them as transportation costs. Transportation costs do not necessarily mean less than carload freight rates and motor truck rates, although both rates are a part of the transportation costs.

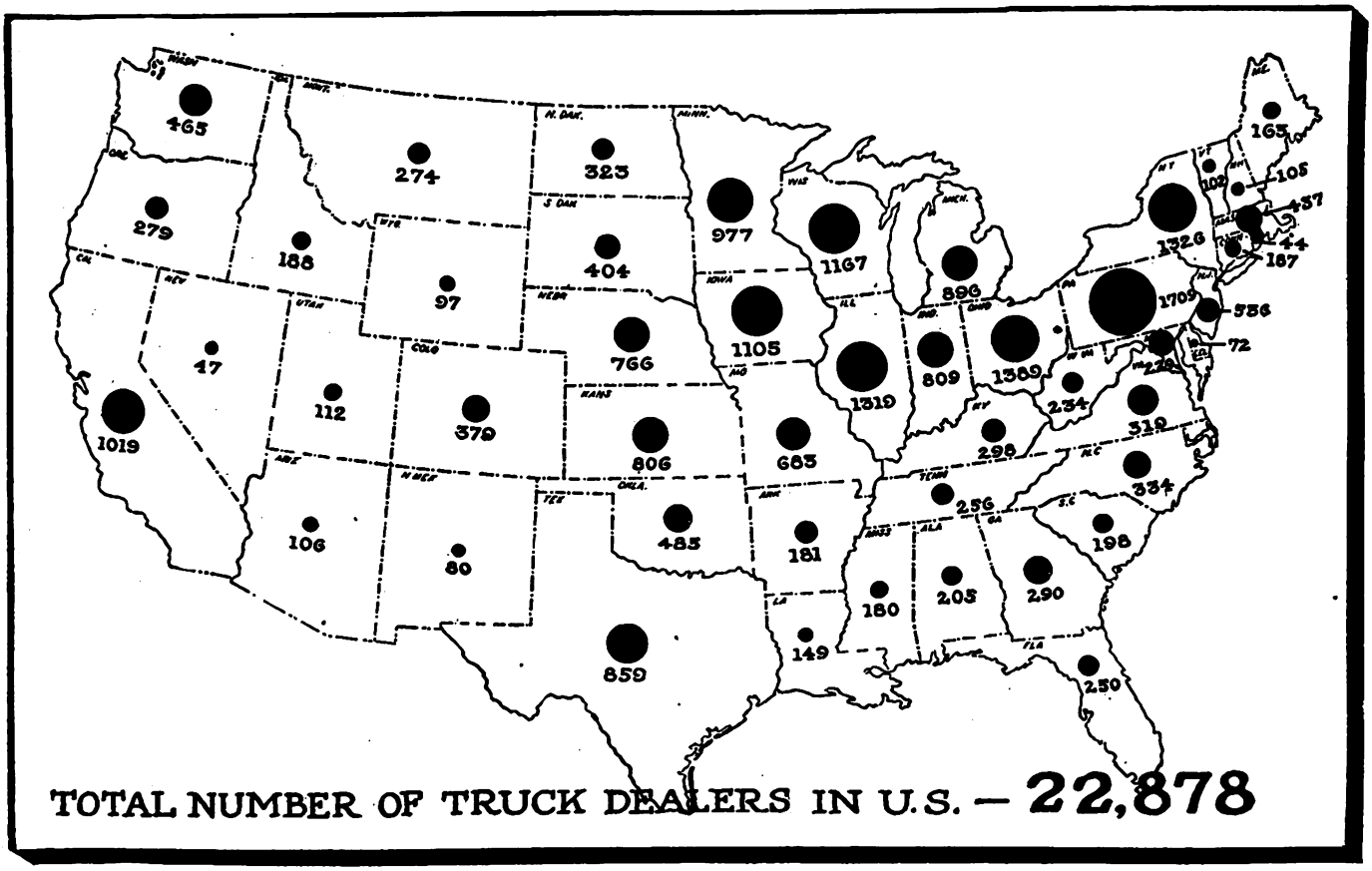
"What I understand to be a true transportation cost is all expense involved in making a shipment, starting with the boxing, or packing expense, together with handling expense in the shipping department, the loading of freight on teams for delivery to the freight house, teaming charges from the shipping department to the local freight house, and additional labor incidental thereto. To this must be added the less than carload freight rate and additional charge for cartage at the delivery

Raw Materials Used in Construction of Cars and Trucks During 1921

Iron and steel, tons	1,464,000
Production of iron and steel, 1921 (Iron Age)	36,150,000
Per cent. used in manufacturing cars and trucks	4%
Aluminum, pounds	43,250,000
Production of aluminum, 1920 (American Metal Market)	198,000,000
Per cent. used in manufacturing cars and trucks	22%
Copper, pounds	83,425,000
Production of copper, 1921 (Survey of Current Business)	510,000,000
Per cent. used in manufacturing cars and trucks	16%
Tin, tons	12,510
Total consumption of tin, 1921 (American Metal Market)	60,000
Per Cent. used in manufacturing cars and trucks	20%
Lead, tons	6,670
Production of lead, 1921 (American Metal Market)	390,000
Per cent. used in manufacturing cars and trucks	1.7%
Nickel, pounds	3,400,000
Leather, upholstering, square feet	37,165,000
Total production of upholstering leather, 1921, estimated by the Tanner's Council at 54,000,000 square feet, but of which only 35,000,000 square feet was suitable for upholstering automobiles.	
Upholstering cloth, yards	5,357,000
Imitation leather, square feet	88,400,000
Lumber used in manufacturing cars and trucks, feet	313,800,000
Glass (mostly plate glass), square feet	16,500,000
Production of plate glass, 1921, approximately	55,000,000
Per cent. used in manufacturing cars and trucks	30%
Top and side curtain material, yards	15,330,000
Hair and padding, pounds	16,000,000
Paint and Varnish, gallons	5,900,000

(Accessory & Garage Journal)

The inventory of car and truck production in 1921



(Chilton Co.)

Distribution of the truck dealer organization in the U. S., showing remarkable concentration in North Central States.

point, with such other expenses that may be caused by requests for tracing, duplication of shipments lost or damaged in transit, entering of claims, checking of freight bills, delay to shipments in transit, and the expense of carrying additional stock to take care of freight in transit when moving via rail carriers.

"All of these costs are properly transportation costs, and are a part of the shipping expenses which are paid either by the shipper or receiver."

In England the railroad companies, less liberal, apparently, than ours, keenly feel the competition of truck transportation, and recently made a drastic attempt to eliminate this opposition. Two important groups of railways, the Northwestern and the Midland, attempted to secure a monopoly of transportation in the areas within which they operate. The trucking interests, after watching the attempts of the railroads to acquire truck lines, decided that the roads intended to stifle competition by cutting rates, thus breaking up the existing highway transport companies and finally diverting traffic back to the railroad lines. They therefore determined to fight the railroads with all their power.

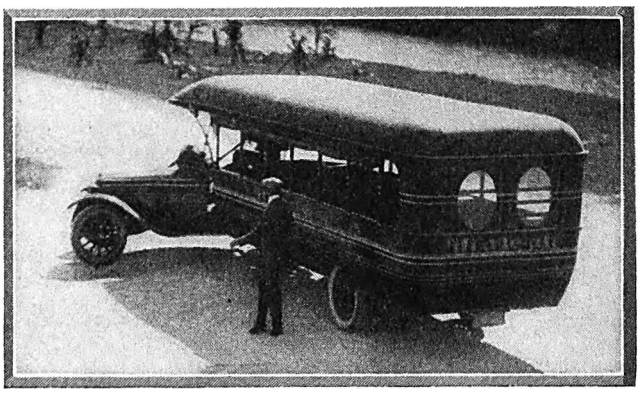
It was necessary under the British law for the railroads to get the permission of Parliament before they could operate as truck owners, except at their own terminals. They already had the right to collect and deliver freight by truck, but not to transport it by highway exclusively. The truck interests, consisting of truck manufacturers, road transport companies and general industrial undertakings employing trucks, combined to bring pressure to bear upon Parliament to refuse the request of the railroads for extension of their franchises. After a struggle the truckmen were successful.

According to *Automotive Industries,* a similar situation may develop in the United States, especially in California; and the magazine implies that the truck interests in this country ought to form a combination similar to that which was successful in Great Britain, so as to be prepared for all contingencies.

* * *

Observers of the automotive industry believe that this is going to be a record year for trucks. The wholesale value of the truck output in 1921 was $166,082,000; this year it is predicted that production will reach $250,000,000, and that the sale of tires, oil, gasoline, parts, equipment, etc., will bring the total sum spent on trucks up to $1,000,000,000.

Farmers are expected to want more trucks to carry their big crops, for which, it now seems, they will get good prices. The growth in bus transportation, which has now got out of the hands of the old rough "jitney" class of operator and into the control of substantial concerns which seek to operate regular lines, will increase the demand. Trucks will be needed to carry coal over comparatively long routes, to help the railroads, whose capacities will be taxed to the limit. It has been computed that coal can be



(© International)

An efficient auto bus, invented by Glenn Curtiss, of air fame, is 37 feet long and will turn in a 30-foot radius by means of the unique body which "breaks" as shown above.

shipped economically by highway over as great a distance as that from Scranton, Pa., in the anthracite section, to New York City, because of the savings effected in loading, unloading and lighterage charges. The coal delivery companies in the cities, who have been idle all summer, will need additional trucks in order to convey the winter's supply to householders.

The 1922 situation in truck production and registration is thus summarized by the *Commercial Car Journal*:

"Analysis of all existing data indicates conclusively that total sales in the commercial car industry for 1922 will exceed $1,000,000,000, if we total the five principal items: (1) Commercial cars built during 1922; (2) operating supplies; (3) special truck equipment; (4) replacement parts and supplies; (5) service labor.

"About 250,000 commercial cars will be built in 1922. The f.o.b. sales value of these trucks will approximate $250,000,000, or nearly one-quarter of estimated total sales in the motor truck field.

"Gasoline, tires, and lubricating oil are the principal items to be considered under the head of operating supplies.

"Between 1,100,000,000 gallons and 1,200,000,000 gallons of gasoline are annually used for motor truck operation. At an average of 22 cents per gallon, the gasoline bill will total $250,000,000.

"Nearly 5,000,000 tires will be required this year for commercial cars. These will cost approximately $175,000,000.

"About 75,000,000 gallons of lubricating oil at 50 cents per gallon will bring the bill for commercial car lubrication to $37,000,000.

"Sales of truck equipment will consist principally of special bodies, cranes, hoists, winches, cushion wheels, etc. About 200,000 special jobs at an average of $300 apiece will be required this year. Other truck equipment, costing about $15,000,000, will bring the total of equipment sales up to approximately $75,000,000.

"Replacement parts constitute an increasingly important item of sales in the commercial car field. Sales of such parts in 1922 will total $73,000,000.

"Labor for service and repairs is figured at about $140 per truck per year, which brings the total for over 1,050,000 trucks to about $150,000,000.

"If facts were needed to demonstrate that the commercial car industry is just getting into its business stride, a glance at the showing increases in registration totals for the past few years would dissipate all doubts.

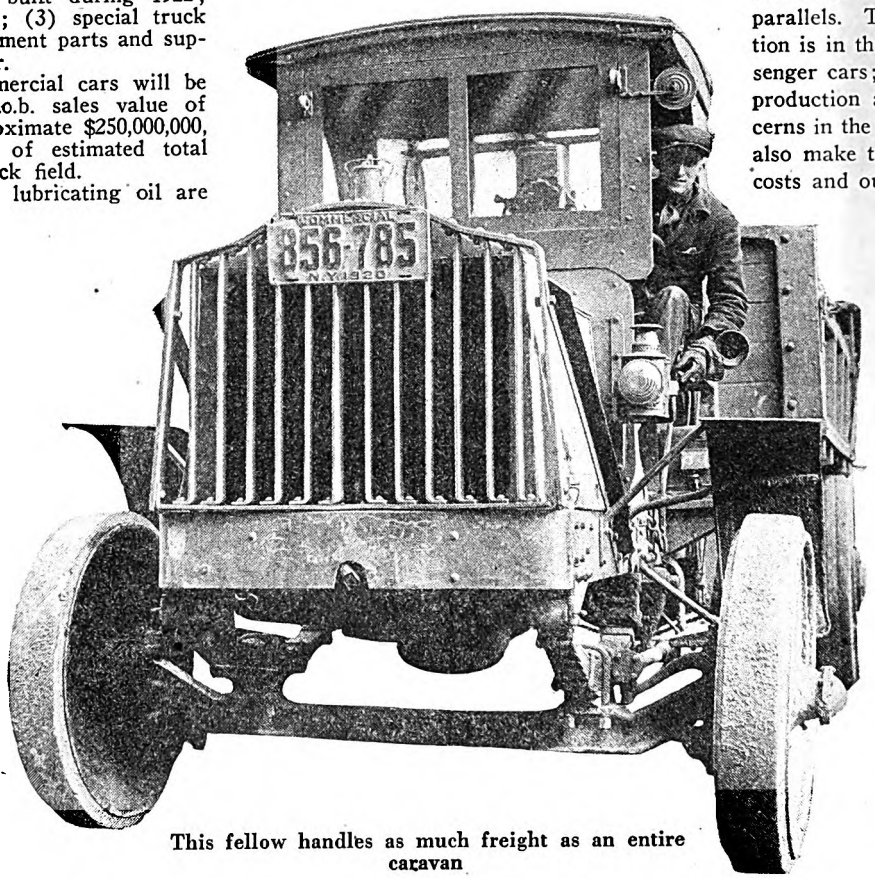
"In 1913, there were 64,000 motor trucks registered. During the period from 1913 to 1921, commercial car registrations have climbed from 64,000 to 1,050,000, an increase of 1540%. During the same period, registrations of passenger cars have increased from 1,159,034 to 9,455,000, or 715%.

"It will be seen, therefore, that the demand for commercial cars has increased at a much faster rate than has the demand for passenger cars, in spite of the fact that the constantly expanding market for automobiles, during the past decade, has been one of the marvels of modern business life.

"Strictly speaking, the commercial car had hardly become a vital factor in industrial life prior to the entry of America into the World War in 1917. The greatest increase in the number of trucks in use has come about during the four-year period since the end of 1917. Hence, a comparison between truck and passenger car business since 1917 brings out the salient facts more clearly.

"Passenger car registrations have increased from 4,805,331, at the end of 1917, to 9,455,000, at the end of 1921, an increase of 96%. During the same period, commercial car registrations have grown from 289,000, at the end of 1917, to 1,050,000, at the end of 1921, or 263%.

"If we scan the above figures, we note that during the past four years the number of commercial cars in use has increased nearly three times as fast as is the case with passenger cars, in spite of the fact that during 18 months of this period the country witnessed the worst business depression in a decade."



This fellow handles as much freight as an entire caravan

The automotive industry is at present in a competitive condition which no other industry parallels. The heaviest competition is in the manufacture of passenger cars; but this affects truck production also, for the big concerns in the passenger car business also make trucks, and their truck costs and output are certain to be affected by conditions in the other branch.

The condition of the automotive industry can best be represented graphically by two pillars resting on a single base. The base is the cheap car, made by Henry Ford and a few minor competitors. Rising about it are two parallel piles, representing the car manufacturers in the higher price classes. One pile represents the General Motors Corporation, whose business is built upon the theory of "one car in each class." On the other side are competing manufacturers in each class—Durant, Studebaker and the rest.

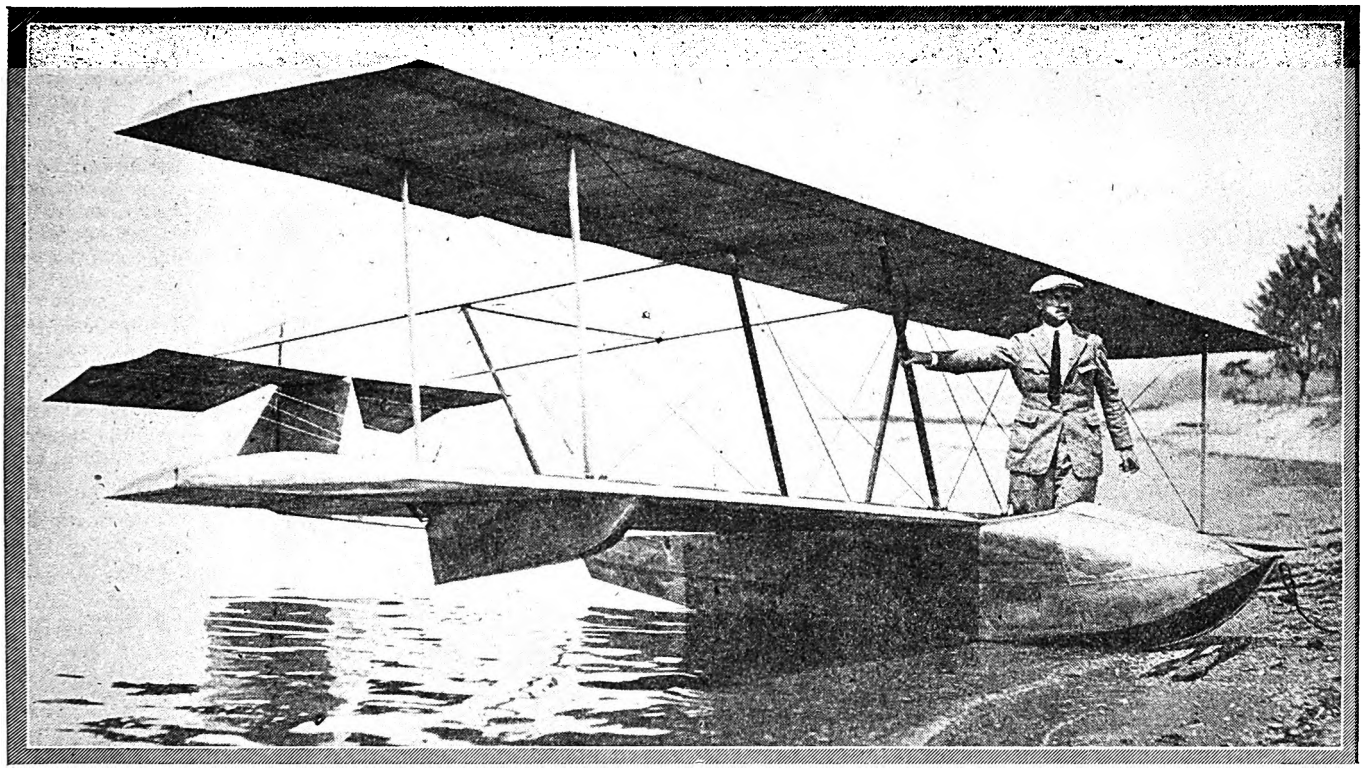
Competition between the two sides is terrific. Not long ago a price war was started, which, it was expected, would last for a long time, each side successively cutting under the other. The first cuts have been made by General Motors and by its chief competitors; but further slashes have not yet been forthcoming, and the opinion in the trade is that after those manufacturers who are out of line with present prices have made their cuts, the slashing will end for the present.

The condition of the trade is thus summarized in *The Bache Review*:

"One of the phenomenal developments in the revival of business which has been proceeding during the present year, is the long leap ahead of output in the automobile industry. Recently, reduction in some motor prices has stimulated sales, but has not greatly reduced earnings, by reason of the larger production. The cut was intended to speed up sales. Not all manufacturers joined in the price reduction, and those who did not, report practically no falling off in their sales.

"July is usually a month of seasonal decline in output, but production this year exceeded that of July, 1921, by 39%, and that of July, 1920, by 20%. This July output constituted the record figure in automobile production for the month of July,

(*Turn to page 1588*)



Results of the recent contests for motorless planes in Germany have suggested all sorts of possibilities for gliders. The above plane, the contribution of Glenn Curtiss, is a motorless seaplane, costing less than $1,000 and weighing only 140 pounds.

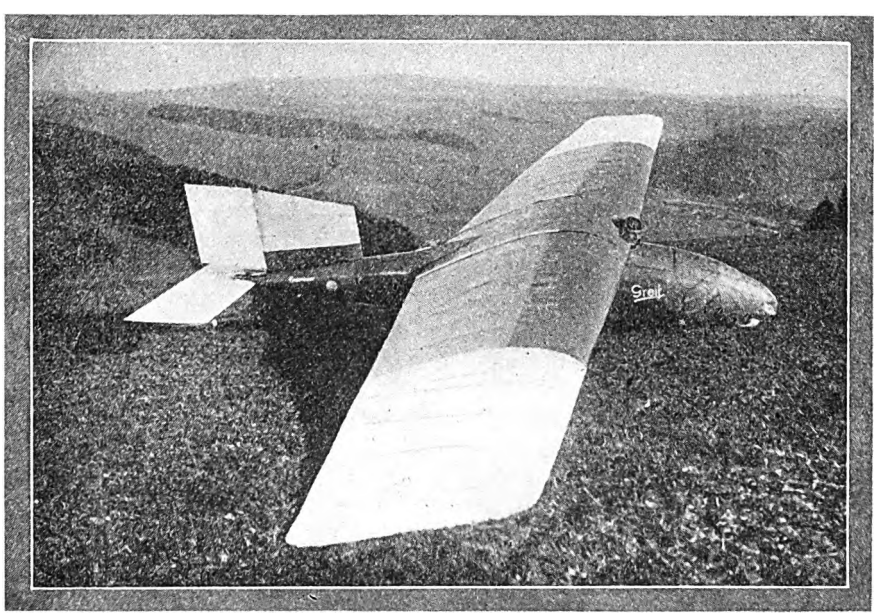
Sailing in Three Dimensions

The Germans take a lesson from the buzzard and the albatross—and astound the world with marvelous gliders

WHEN a German named Hentzen flew for three hours and ten minutes in an airplane without a motor he set the world to wondering and speculating. How did he do it? How much farther can this motorless flying go? Of what practical value is it? These were the questions which everyone asked.

Industry is interested primarily in the last question: what practical results will come of the gliders? Aeronautical experts assure us that the glider experiments have great practical significance and that they may lead to the development of cheap and efficient aerial transportation which will be of real importance to industry.

There seems to be a great gap between a light machine balanced delicately on a rising air current and a solid, effective freight carrier. Yet the authorities say that the first may lead to the last. They do not expect that motorless flight itself will be employed industrially, but they think that the experiments with gliders will teach lessons to aeronautical engineers that will enable them to build better gasoline-propelled planes. Gliding ability will increase the factor of safety in case the motor goes dead. Moreover—and this is more important—motorless flight requires the development of wings with greater lifting power, which will permit slower flight and less powerful motors.



The graceful Greif glider in which Martens, young German technical school student, startled the world with a recent flight of more than two hours.

"At the beginning of the 20th century many inventors in various parts of the world were building and trying out gliders," says Glenn H. Curtiss, pioneer

flyer. "It was the needful preface to motor-driven flight. In 1907 we constructed and flew several gliders of flimsy fabric and wood construction. Shoving off from the 300-foot hills in the vicinity of Hammondsport, N. Y., we glided safely and successfully for some seconds. Our gliders were equipped with one elevator simply and had but little inherent stability. We were then chiefly interested—as were most of our contemporaries—in solving the problem of control. At that early date this was accomplished often by shifting the body.



Aviators Martens and F. W. Hentzen, German students, who flew away with all honors at the international glider contests at Gerzfeld, Germany. Hentzen's world record is 3 hours and 10 minutes.

"The development and application of the internal-combustion engine to air navigation turned the attention of engineers to speed, and this interest was intensified by the World War, with a consequent improvement in mobility of all types. Speed, since the ending of the war, has lost none of its attractions for us, as well as for the other Allied nations, and in the United States, England, France and Italy splendid advances have been made in overcoming resistance and inertia.

"But the Germans, having been denied the privilege of working out their ideas along the lines of great size and swiftness, set about the less spectacular but very significant problem of designing low-speed, high-lift aircraft. Experimentation along this line has been going on since 1919, though the flights last year in the Rhone Valley were the first public demonstrations. The Germans, unhampered as we were 20 years ago by imperfect control, and possessing practical knowledge which no one had at that time, began immediately with a great advantage. But even so, their success is a challenge to the rest of the world.

"Out of gliding and soaring flight we can learn how to build lighter, more efficient airplanes, and, having built them, to utilize natural air currents to the consequent saving of artificial motive power.

"We are now at a stage in aeronautics in which the buzzard and the albatross appear prominently. The buzzard is a magnificent soarer. In flat country, where the buzzard is most frequently found, air rises from the surface of the earth in waves and sometimes in spirals. Frequently I have watched a buzzard, with marvelous instinct, seek and find 'lodgment' in one of these spirals and thus be literally lifted out of sight.

"Over the water the albatross is king of the air. He is superior even to the buzzard. The buzzard is comparatively lightly loaded, sometimes only one-half pound to each square foot of wing surface. The albatross has a wing loading of more than three pounds a square foot.

"The German and French experiments have been confined to hilly areas. I believe that the greater field lies over the water. The albatross, with little effort, takes off from the crest of a wave and rides the winds for hours. If we can learn the secret of the albatross's instinct we, too, can soar at will over the surface of the sea.

"The Germans have very appropriately called their gliders 'sail planes.' Gliding or soaring is simply aerial sailboating in three dimensions. In marine navigation we have developed many types of craft and methods of operation. In the air we have a broader opportunity. *By lessening our speed and increasing our load we cheapen air transportation and make it more generally available.*"

Three outstanding achievements in motorless flying have been recorded in the last few weeks. First is the remarkable record of Hentzen and his fellow students in Germany. Second is the achievement of Fokker, the Dutch airplane designer, who flew for 13 minutes in a glider with a passenger. Third is the partial success of Curtiss in his attempt to make a flying-boat glider rise from the surface of Manhasset Bay, Long Island, N. Y. Curtiss's boat rose when an unexpected breeze struck it while it was being towed back to its hangar. It stayed in the air nine seconds.

The Curtiss gliding boat is designed to rise from the surface of the water at 20 miles an hour. This speed is from 15 to 20 miles slower than that which most motored airplanes must attain before they can fly. The Curtiss boat weighs 150 lbs. when empty, has a span of 28 ft., a length of 22 ft. 11 ins., and a wing area of 267.5 sq. ft.

The newspapers express both wonder at the achievements of the sailplanes and the expectation of important future developments. The *Indianapolis News* says:



(Photos by Wide World)

America was represented at the French glider meet at Clermont-Ferrand by Edmund Allen, seen above in his flight of 80 seconds from the top of Combegasse hill.

"Predictions are made of voyages for thousands of miles through the air using only the forces of the air itself as means of propulsion. How sound these predictions are the non-technical reader is not in a position to judge. After seeing telegraphy and telephony become wireless, he is likely to hesitate before declaring positively that air travel cannot be made

motorless. Sailing of the seas by air-current power preceded by hundreds of years travel over them by motor power—that is to say the steamboat. In the art of sailing the air the motor-driven vessel has preceded the motorless one in the development of sustained and directed travel, though experiments with gliders by the Wrights preceded their use of the motor.

"Various opinions have been expressed about gliders recently by those who are supposed to speak with understanding of the subject. The poise and progress of gliders in the air have frequently been compared with those of certain birds that have a wide stretch of wings by which they keep aloft almost effortlessly. The obvious comment has been made that, though these birds do seem to get along admirably with a plane-like arrangement of wings, every one of them is equipped with a motor of remarkable strength and efficiency compared with the bird's size. Analogies are always interesting and are sometimes convincing. Maybe this point about every bird having a motor proves that it is foolish to expect great things from an airplane without a motor. Then again maybe it does not. The more correct analogy may be sea and air travel. The ignorant onlooker will wait to see. With no knowledge of scientific facts at all, he will at least be free of those prejudices that so often come from a partial and insufficient knowledge of them.

"One opinion that has been expressed regarding the development of gliders is that experiment with them has been valuable not so much in pointing the way to motorless air travel as toward suggesting development of planes with much less heavy and powerful motors than have been regarded as necessary. Following the analogy of the bird, it is reasoned that a good plane with a light motor should be the line of development for practical commercial flying and ordinary passenger needs. The remarkable developments of airplanes that attended the war were along lines in which all ideas of expense were disregarded. Greater economies of operation must be shown if the airplane is to become a routine and practical business instrument. However, even if travel by gliders or in airplanes of low motor power becomes a fact, the development of big air engines is not likely to cease. The same column of the *New York Times* which recently carried a special dispatch from London telling of the wonders of endless travel expected from German development of gliders carried another London dispatch telling of orders by the British Government of giant engines for airplanes of 1000 hp. and capable of 1800 revolutions a minute. These are expected to give new war airplanes a range of 2500 to 3000 miles."



(Chicago Tribune)

There just ain't no such thing.

Various explanations are offered as to how the Germans performed their gliding miracles. Before the exhibitions at Gersfeld, Germany, a flight of a few minutes in a motorless plane was considered a great achievement, but the Germans overshadowed all that had gone before. They were stimulated to research along these lines, it is said, because the Peace Treaty placed restrictions upon the construction of airplanes in Central Europe. An ingenious theory was advanced in a cable dispatch by Samuel Dashiell to the *Public Ledger* (Philadelphia). Mr. Dashiell said a well-known German ace had told him that the Germans base their hope of supremacy in flying upon the use of a liquid applied to the face of the pilot, which enables him to sense the varying air currents as a bird does. He writes:

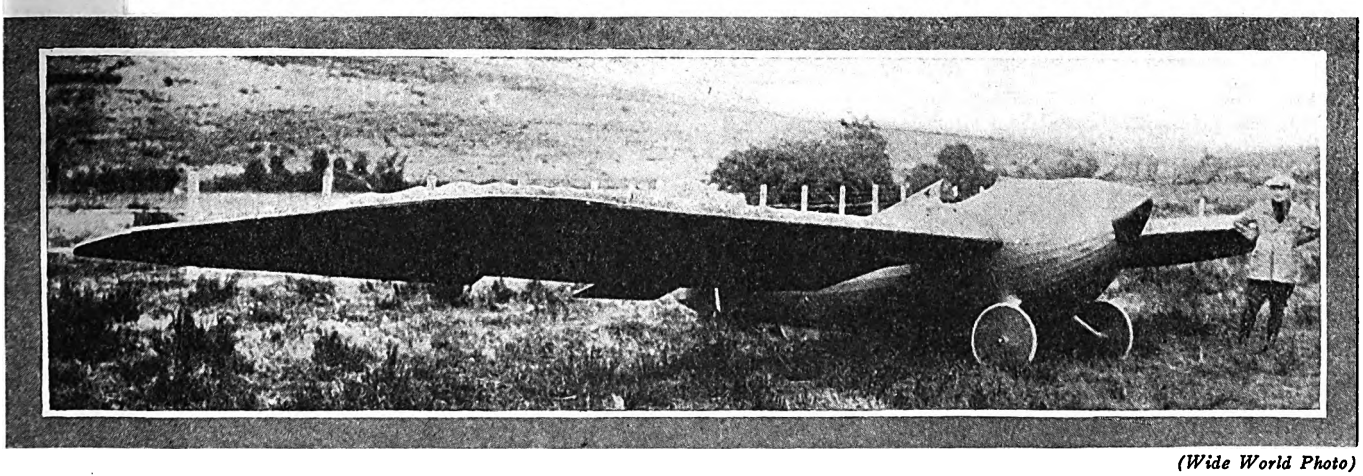
"A significant fact is that the successful German plane that stayed aloft more than three hours was the result of six years of research, and indicates that German supremacy in glider planes is not the outgrowth of the Peace Treaty restrictions, but simply a result of a German General Staff plan conceived in the course of the war in 1916 and carried out to the present day.

"Germans back their hopes of revolutionizing aviation with a strange sensitizing liquid which is applied to the face of the pilot. The pilot becomes endowed with a kind of sixth sense; he becomes a bird with a highly sensitized head, to which every current of air is perceptible. The application renders a man as capable of judging the strength and direction of air fluid as is a swallow or a seagull.

"Experiments were begun at Magdeburg, with 50 of the most experienced aviators, chemists and mathematicians obtainable participating. The study of bird flight was an elementary step. Here, for the first time, moving pictures became an aid to the work. Since then motion pictures have followed every development, and still are revealing facts to scientists hitherto unknown.

"The new aviation school was called 'the central institution

(*Turn to page 1588*)

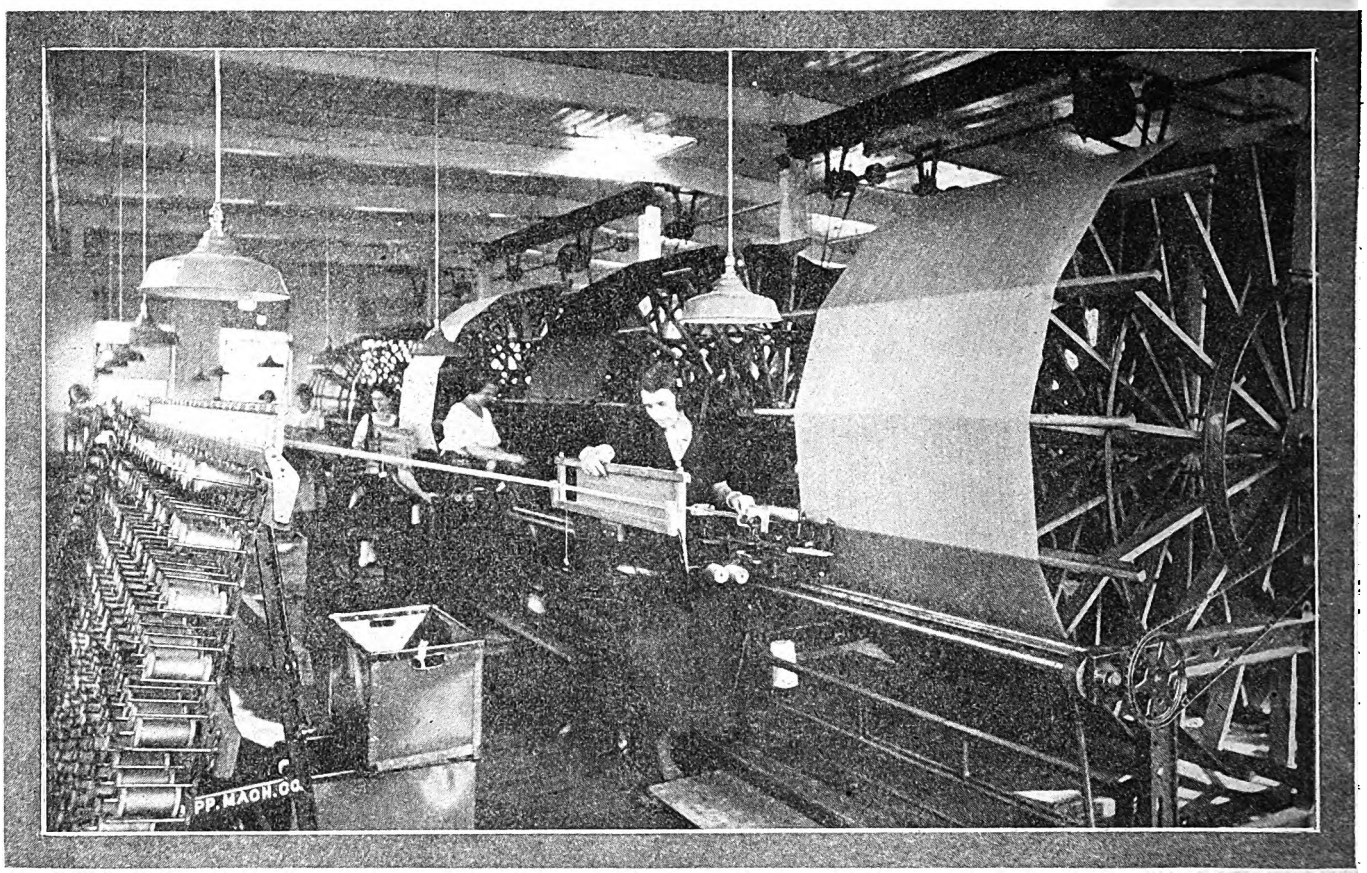


(Wide World Photo)

This birdlike contrivance was a French entrant in the international competition for motorless flying planes at Clermont-Ferrand, France. The glider was entered by Deshayes.

"Fine as Silk" Is Appropriate Again

How the silk industry has regained something of its normal prosperity



Warping-room in a large Pawtucket silk factory. Spools from the winding-room are placed on the rack at the left. The fine strands pass through the machines at which the girls are standing and thence to the big reels.

EVERYBODY is talking about it in Paterson. When you know that we mean Paterson, N. J., and when you remember that Paterson is the silk center of the United States you will understand. You will recall those dreary days of the silk panic, when Paterson and all the other silk cities were "flat."

But today Paterson is cheerful once more. For the silk industry is "coming back." And from the mayor to the office boy in the smallest throwing mill everybody is talking about it. The broad silk manufacturer is perhaps the most jubilant, for there is a greater proportionate demand for his product than ever before. He is no longer sitting in his deserted office counting the number of failures and thanking his lucky stars that he is not listed among them. Instead, he is busy at order-getting and, sometimes, order-taking, for in many cases retailers' stocks are low.

Even Fashion seems to be on the side of the silk industry. It is pointed out that the longer skirt will mean a demand for more yardage, not only because of greater length, but because longer skirts are necessarily made wider than are the very short ones.

Hosiery manufacturers also look with interest upon any change in style which may have an influence on their business. It is not believed that skirts will attain the extreme lengths of years ago, except possibly for formal wear or as a temporary fad. So long as six inches of hosiery show, the American woman will demand that her hosiery be silk, and silk of good quality. There is prospect for an increase in the use of colored shoes, which will mean a corresponding increase in colored hose to match shoes or gowns.

The longer gown will also create a demand for ribbons, a branch of the industry that has suffered particularly from the abbreviated styles of the last few years. It is stated by veterans in the trade that the longer gown is inevitably followed by the larger hat and all the distinctly feminine accessories, ribbons, laces, fans, etc.

The wearing of a more formal style of dress, which is likely to accompany longer skirts, will probably increase the sales of gloves, which have not been very good during the last year or so.

The glove-silk underwear business has also begun to improve. Garments of good quality are lower in price than they were a year or two ago, and women are beginning to realize the ultimate economy of their use.

In every branch of the silk trade the belief is growing that the corner has been turned and that the continued improvement in buying may be expected for the next six months. It must be remembered, however, that there is another side to the picture.

Although raw silk imports and American consumption for the crop year ended June 30, 1922, have far exceeded previous records, the fluctuation in the price of raw silk in the

past year has been responsible for a number of idle looms in the important silk manufacturing centers. And at present, according to *The American Silk Journal,* the raw silk market has been quiet, with broad silk manufacturers remaining out of the market in an apparent effort to force prices down.

The stabilization of raw silk prices remains very much in doubt. Early in August 200 of the leading Japanese raw silk filature men cut production 30% in an effort to force American buyers into paying Japan's price. In spite of this prices for Japanese raw silk have continued to drop.

A hopeful view of the situation is taken by *The American Silk Journal,* which states that:

"While the strongest interests dominating the Japanese raw silk situation still seem partial to the idea of making the raw material stand all the price that the traffic will bear, there are other factors in Japan who believe that unless the price of raw silk is lowered and stabilized at a reasonable level the silk business will be adversely affected, because the price of finished silk hosiery and other articles of feminine wear will continue to be beyond the purses of the public.

"It may, therefore, be welcome news to American silk manufacturers to learn that some Japanese silk men at least realize that the unwarrantable jumping of the price of raw silk is certain to kill the goose that lays Japan's golden silk egg."

A writer in a recent issue of the *Saturday Evening Post* points out that:

"One reason why Japanese prices are all out of gear today is that there has been too much government support of them. This constant subsidizing has had the tendency of giving the Japanese producer a dependence upon paternalism that frequently sterilizes his initiative and judgment. . . . With silk, as with most of the other important industries, especially cotton and steel, the Japanese Government is the guardian angel. Whenever a big slump comes it goes into the market and buys immense quantities in the effort to bring about stabilization. Frequently this inflates the price to an artificial standard."

Tariff Hinders Recovery

ANOTHER factor that tends to retard recovery is the uncertainty in regard to the tariff. It is pointed out by the chairman of the American Silk Association that under the Underwood Bill importations of Japanese and Chinese silk goods have increased approximately 700% and that—

"Few people realize that we are at present dealing with an unusual economic situation complicated by an inflated currency. Values based upon pre-war levels have no meaning today, and comparisons with previous years are practically useless.

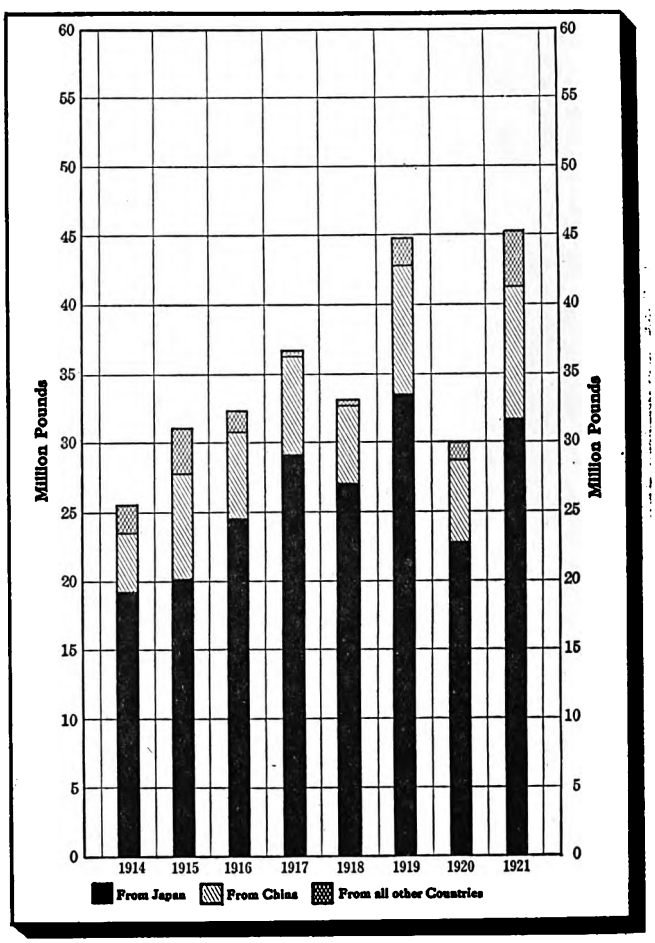
"Tariff rates in the present bill are relatively no higher than in 1909, although, disregarding the effect of the differences in exchange, wage increases here have advanced 200%. The silk workman stays in this country and spends his high wages here, and thus does his share toward promoting general prosperity. The significance of these facts is not fully realized."

James A. Goldsmith, president of the Silk Association, remarks that:

"With imports increasing so that today they have become a serious menace, can we believe it possible that domestic manufacturers can be so neglectful of their own interests as to be satisfied with anything less than a tariff sufficiently protective to enable them to operate their plants? And if the present tariff is sufficient protection, who can explain why, with silks enjoying fashion's favor, only 49% of the country's looms are in operation, and why imports have increased until they reached the astounding figure in 1921 of 68,000,000 sq. yds.?"

But even if the American manufacturer is given all the protection necessary, there are still other questions to be settled if the industry is to operate efficiently. In no other industry are there more rapid transitions of prosperity and comparative poverty. Discussing this phase of the question, Walter Frazer, a broad silk manufacturer, says that the present period of readjustment should be used to seek and find the cure for some of the ills from which the industry suffers. While he points out that the inability to control the raw silk market is one of the chief reasons why silk manufacturing is a highly speculative business, he cites two other reasons for idle looms and slump seasons. He questions whether there is not too great a tendency to concentrate upon the production of a favored weave, and states his belief that manufacturers should strive to evolve distinctive and individual fabrics which "by their very worth commend themselves to the buying public." He adds:

"Fashion does not create a fabric. This is done by the manufacturer. Fashion favors certain ones as against others, but women, in their desire to buy a thing of beauty, do not all



(Silk Association of America)

Imports of raw silk into the United States, calendar years 1914-1921.

want to have exactly the same thing. In fact, their desire is in exactly the opposite direction, and if manufacturers would strive more in a personal way to bring out different types of fabrics, could not the tendency which is now so strongly running in favor of one fabric be diverted into that of many? Is it possible, or is there already discernible a drift toward a concentration in the manufacturing field that would give greater potency to buying power and greater control over the irresponsible elements in both the manufacturing and distributing fields?

"It is well known that there are entirely too many concerns in the distributing end of the silk business. They are run, in a great many instances, by men of but little experience, and even less capital, who were attracted to the industry by the ease with which money was made in the boom period of 1919. As long as business is good, there is no trouble, but ten days or two weeks of dull business brings to these operators the urgent need of sales to take care of their maturing obligations. The breakdown of prices always starts with these concerns. . . .

(Turn to page 1589)



Sugar beets on the first lap of their journey from the field to the sugar bowl—a trainload being delivered at the factory.

What *Is* An Infant Industry?

And is the beet sugar industry entitled to protection as such—or is it able to stand on its own feet?

IT is possible that the publicity which has been given the proposed tariff against Cuban sugar will result in a modification of the plan to extract some $217,000,000 from the American sugar bowl every year.

The beet sugar interests, under the leadership of Senator Smoot, contend that the Government should accord the same measure of protection to their industry at this critical period in its growth that it does to other infant industries. For it is pointed out that the beet sugar industry is less than 50 years old. For the length of time it has been in existence it has made remarkable progress. In 1879 the first beet sugar factory was started in Alvarado, Cal., with a capitalization of $100,000. Operations were necessarily on a very small scale, and only 50 tons of beets were used a day. Yet from this beginning has grown an industry that reaches over 17 Western States, consumes more than 6,000,000 tons of beets a year, and has an invested capital of $175,000,000.

Senator Smoot shudders when he thinks of the cane bugaboo. He fears that if the market is flooded with Cuban sugar the beet industry, with its large surplus stocks and its greatly expanded production, will be "driven to the wall." Senator Smoot calls attention to the fact that the beet sugar manufacturers were recently compelled to borrow $10,000,000 from the War Finance Corporation to pay the farmers for their beets, and charges that the money powers of Wall Street and the refiners are seeking to flood the market with Cuban sugar for the sole purpose of destroying our beet sugar industry.

It is claimed that a low tariff would be the proverbial last straw to be added to the beet sugar manufacturer's burdens, and that to force him to compete with Cuban cane sugar at this time would be equivalent to penalizing him for his effort to speed up production during the war.

Opponents of the sugar tariff suggest that the money made by beet sugar refiners during this period should make them independent of all protection and financially well able to take care of themselves.

Beet sugar companies for years having made a profit of only some 30% on their investment when the duty on sugar was 1 cent per pound (as against the proposed 1.84 cents) do not seem to be in need of very much protection, especially when that percentage of profit is made on what some experts consider a large overcapitalization.

Senator Smoot contended that refiners needed protection in order that cane sugar might not drive it out of business, and because beet sugar sold in competition tended to keep the price of refined cane sugar down.

But the Federal Trade Commission, in its report on the beet sugar industry in the United States, states that "prices of sugar are considerably higher in those sections of the country where there is little or no competition from Cuban sugar. A compilation of weekly quotations in Detroit, Denver and San Francisco for beet sugar has been made. . . . At practically all times the quotations for beet sugar in these three markets are above the quotations for cane sugar in New York."

The opponents of the high tariff continue to fight any measure which will restrict Cuban production and point out that of the total annual sugar consumption of the United States in pre-war years, 49.8% was shipped from Cuba, 13.66% from Hawaii, 8.01% from Porto Rico, 6.27% from Louisiana, 7% from miscellaneous foreign sources and the Philippines, and 15.97% from the domestic beet sugar crop. It is pointed out that Cuban sugar has been, and will remain, the largest single source of supplies for the United States.

The amount of the increased protection which the beet sugar interests demand is illustrated by the following figures: The United States Tariff Commission has found that the average pre-war cost of labor to make a ton of sugar from beets was $6.63 per ton and that the after-war period increased it to $12.04. Although there is no data available at present for this year's crop of beet sugar, it is believed that the figures are somewhere between the pre-war cost and the high cost, or, say, $10 per ton for labor. Six hundred and fifty thousand tons amount to $6,500,000 in wages for the 35,000 workers.

The present crop, therefore, means in dollars and cents to the farmers approximately $30,000,000 and to the 35,000 mill operatives which Senator Smoot estimates are employed in the industry, $6,500,000, or a total of $36,500,000, and to protect this sum the American public is asked to pay in duties $110,000,000, a tax in the shape of a protective duty five times as much as the cost of the beets and labor at the factory.

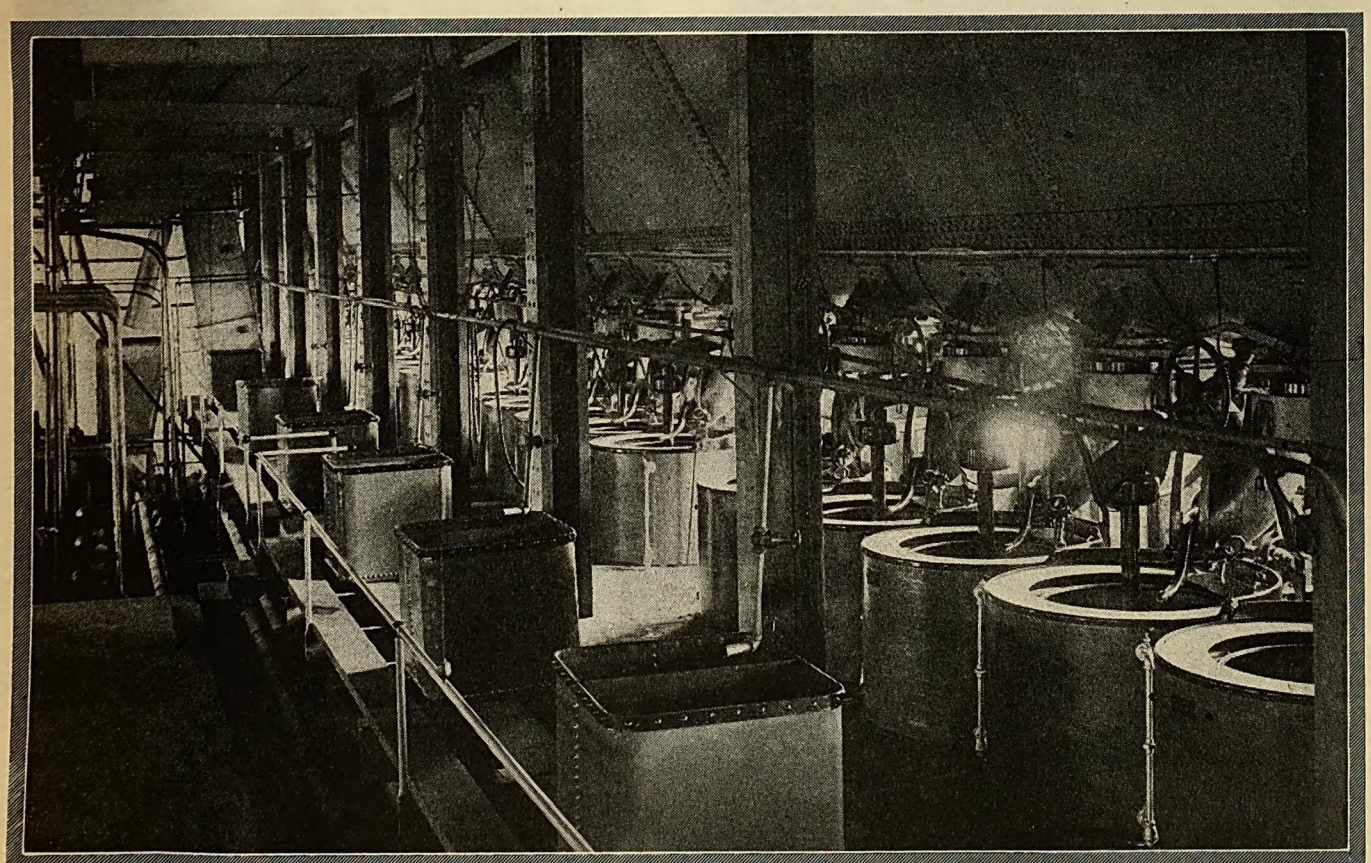
Or to cite another example, the increased duty amounting to $192,000,000 would be as much as the entire investment in the beet sugar industry, plus the cost of the crop and the labor producing it.

The higher prices obtained by sugar producers during the war were effective, so far as increased output goes, only for the Cuban producer. The cane growers did materially increase production, but our beet sugar manufacturers' increase was so small a part of the total as to be negligible.

Cuba's main industry is sugar. In no other country can sugar be grown so cheaply. It is admitted even by leaders in the beet industry that Cuba is the cheapest sugar producing country in the world, and can send the United States all the sugar it needs at a lower rate than the domestic industry can produce the little it does supply. Moreover, Cuba has not yet reached the limit of production. And it is estimated that we are absolutely dependent upon Cuba for at least 60% of all the sugar we use.

The recent drop of eight points on Cuban and ten points on sugar from elsewhere is regarded as equivalent to a confession that the duty was far too high. *The New York World* points out that the lopping off of 8 cents on every 100 pounds of sugar from Cuba—since Cuba can furnish the United States with 5,000,000 tons yearly—means a saving of $1.60 per ton, or, figured on the basis of the Cuban supply consumed by America during the last year, a saving of about $3,000,000 to the American consumer.

It is not, however, believed that the fight for cheaper sugar to the consumer is to end merely because an agreement on the tariff bill has been reached. The tariff's commission's attitude in the past has been that the domestic beet sugar barons, who have only $175,000,000 invested and demand a $200,000,000 tariff on sugar to protect them, have been too intensely protected.



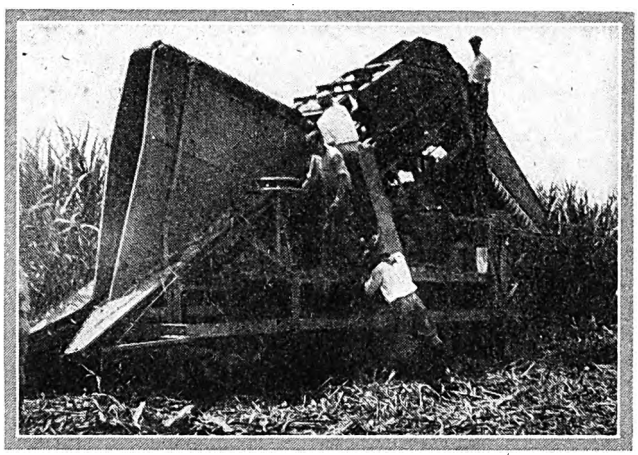
(American Beet Sugar Co.)

The town of Swink, Colo., caters to the American sweet tooth with the help of this centrifugal station in its beet sugar plant.

Improvements and Inventions

Growing Colored Wood

A METHOD of coloring the wood of growing trees was demonstrated to a group of Governmental and technical officials by a German engineer, who has been able to color the tree any desirable color while it is still growing. Various aniline dyes are used, which do not poison the tree or affect its growth in any way. The entire tree, from the very ends of its roots to the top-most branch and leaf, can be colored any desirable shade within 48 hours after the solution of the dyestuff is injected into the roots. About 50 grams of the dye are used to 200 liters of water. The sap of the tree carries the coloring matter throughout its entire structure. This new development opens up many possibilities of securing novel and startling effects in the novelty business, and it also makes possible the perfect imitation of certain natural woods. It is reported that certain Dutch and American interests are giving this process serious attention.



(© Underwood)

Another aid to American sugar producers. The tariff is not the only boon recently acquired by the domestic sugar industry. This sugar cane harvester is said to do the work of 100 men. The harvester cuts the cane, strips it, tops it and puts it on a wagon, ready to be hauled to the mill. This labor-saving accomplishment threatens keen competition between sugar making in the United States and Cuba.

New Cane Planting Machine

A NEW sugar cane planter was invented recently by an American in Cuba, according to the *Manila Bulletin*. This machine plants two rows at a time, throwing out the furrow, subsoiling the bottom and packing the earth over the roots. Economy of labor is said to be one of the chief recommendations of the planter. There is claimed to be a substantial saving in seed, and the machine eliminates a loss which has occurred in hand planting, that is, it gets the cane into the ground while the roots, started by soaking the cuttings, are fresh and vigorous.

New Swedish Potash Fertilizer

A NEW form of potash fertilizer has been introduced in Sweden under the name of "Electrokali." This material is said to comprise finely ground slag from the electric furnace manufacture of ferrosilicon from feldspar and iron turnings. This new product is particularly interesting for it indicates that the steel plant by-products, materials which the plant was originally only too glad to get rid of in some easy manner by dumping into swamps, rivers, etc., are being used profitably in the manufacture of potash fertilizers.

Recovering Sugar From Beet Molasses

ONE of the principal details of sugar making from beets is the recovery of sugar from the beet molasses. A recent development, known as the Deguide process, has been introduced in France and, it is claimed, is making steady progress. It this process baryta is used, and it is now contemplated to use the barium oxide for defecating raw beet juice as well. The important fact about this process is that by these means it will be possible to recover all the potassium and nitrogen compounds that pass into the extracted juice in the diffusion process, which is ordinarily used in this country and elsewhere in the manufacture of beet sugar.

These salts form an ideal fertilizer for the sugar beet and their recovery in the beet sugar manufacture is of high monetary value and should lead to further extension of the Deguide process. In the French industry it is hoped that the process will lead to a marked increase in the cultivation of the sugar beet.

Marsh Gas, Methane, Has Important Industrial Uses

THIS gas has been only of slight commercial importance. It escapes from marshes, which owe their characteristic odor to it. It is contained in natural gas from oil and gas wells, and has been used for making lampblack and as a fuel. A new use has been found for the pure compressed gas and a plant is now making liquefied methane in Germany. It will be of interest to the natural gas and the metal industries to know that there are many advantages to be derived from the use of liquefied methane in the place of other welding gases, such as hydrogen and acetylene, and that the process of making liquefied methane is a commercial success in Germany today. The liquefied gas is kept in the ordinary steel cylinders under a pressure of 150 atmospheres and it is fed from these cylinders to the oxy-methane torch through the usual reduction valves. The oxy-methane flame is admirably suited for welding copper, brass and aluminum, the oxygen flame of the gas being milder and softer than that of any other welding gas. Methane is also being used on an ever-increasing scale for the autogeneous cutting of iron.

Gas Producer Made From Concrete

A REINFORCED concrete gas generator, a new development, has been announced in Italy and is now being used on a large scale for the production of gas in that and other countries of Europe. The body of the apparatus is bell-shaped and is made from reinforced concrete. The base is concrete as well and the producer is set into a shallow vessel, filled with water, which makes a water seal. The apparatus is explosion-proof, and works very efficiently. It is claimed that the initial cost of the apparatus is over 50% less than that of the all-metallic producer. Similarly, the maintenance cost is very moderate and much less than with other types of gas generators.

Bean Boards, a Chinese Development

A NEW form of cattle food, called bean-boards, is made by a factory in Darien, China. The product is being exported to this country. The boards are of rectangular shape, measuring 28 by 12 inches, with a thickness of 5/6 inch. By submitting them to higher pressure than is applied in the manufacture of bean cake, they contain less moisture, rendering them less liable to become moldy in transit.

An Electric Bundle Tier

A NEW invention in the shape of an electric bundle tier has just appeared that will speed up parcel departments. The machine ties a strong square knot, cuts the cord and throws the bundle to one side.



Basic Commodity Prices

(Minimum, at New York, unless otherwise specified)

	Week Ending Sept. 9	Week Ending Sept. 2	Year Ago
Aluminum, pig (ton lots), lb.	.145	.175	.19
Antimony, ordinary, lb.	.06	.06	.0525
Brick, Hudson R., per M.	19.00	20.00	15.00
Cement, Portland, bbl.	1.70	1.70	1.90
Copper, Electrolytic, lb.	.14	.14	.12125
Cotton, spot, Mid. Upl., lb.	.22	.2225	...
Hides, Chic. Pack., No. 1, lb.	.205	.20	.14
Lead, N. Y., lb.	.06	.059	.045
Petroleum, crude, at well, bbl.	3.00	3.00	2.25
Pig iron, Bessemer, Pgh., ton	34.77	33.76	21.96
Pine, roofers 6 in., M. ft.	32.00	32.00	26.00
Rubber, Up River, fine, lb.	.19	.19	.175
Silks, Sinshiu, No. 1, lb.	7.25	7.20	5.65
Spelter, N. Y., lb.	.066	.0655	.0455
Steel Billets, Bess., Pgh., ton	38.00	38.00	29.00
Tin, N. Y., lb.	.32375	.325	.27
Wool, Dom., ½ blood com., lb.	.50	.50	.29

Wholesale Commodity Prices

Coal—			
Bit., ¾ in., lump, net ton	...	...	...
Anthracite, egg, net ton	...	...	...
Coke, furnace, net ton	10.00	10.00	3.00
Cotton Goods—			
Brown Sheetings, Std. yd.	.13	.13	.115
Standard Prints, yd.	.1025	.1025	.11
Print Cloths, 38½ in., 64x60, yd.	.0875	.08625	.09
Drugs and Chemicals—			
Alcohol, ethyl, form 5, gal.	.34	.32	.36
Alcohol, wood, 95%, gal.	.57	.57	.65
Alum, lump, lb.	.0325	.0325	.035
Bleaching Powder, over 34%, 100 lbs.	1.75	1.75	2.25
Borax, crystal, in bbl., lb.	.06	.06	.055
Caustic Soda, 76%, 100 lbs.	3.65	3.65	3.90
Lime, factory, 200-lb. bbl.	1.90	1.90	1.90
Nitric Acid, 42°, lb.	.065	.065	.07
Saltpeter, crystal, 100 lbs.	.0775	.0775	.1075
Soda Ash, 58% light, 100 lbs.	1.75	1.75	2.10
Sulphuric Acid, 60%, 100 lbs.	.45	.45	.55
Flour—			
Spring Pat., 196 lbs.	6.50	6.25	8.10
Winter, soft str't, 100 lbs.	4.85	4.85	6.15
Grains—			
Wheat, No. 2 Red, bu.	1.145	1.145	1.43
Corn, No. 2 Yellow, bu.	.8275	.8075	.77625
Oats, No. 3 White, bu.	.445	.425	.49
Rye, No. 2, bu.	.8275	.81	1.2025
Barley, malting, bu.	.73	.72	.76
Hay, No. 1, 100 lbs.	1.20	1.30	1.45
Straw, lg., rye, No. 2, 100 lbs.	1.25	1.25	1.05
Hides—			
Cows, heavy native, lb.	.19	.19	.1325
Country, No. 1 steers, lb.	.14	.14	.08
Iron and Steel—			
Basic, Valley furnace, ton	30.00	30.00	19.00
Steel bars, Pittsburgh, 100 lbs.	2.00	2.00	1.65
Beams, Pittsburgh, 100 lbs.	2.00	2.00	1.70
Galvanized Sheets, No. 28, Pittsburgh, 100 lbs.	4.35	4.35	3.75
Leather—			
Hemlock, sole, No. 1, lb.	.29	.29	.26
Scoured oak backs, No. 1, lb.	.55	.55	.54
Lumber—			
FAS Qtd. Wh. Oak, 4/4", M. ft.	145.00	145.00	135.00
Tonawanda Wh. Pine No. 1 barn 1x4", M. ft.	82.00	82.00	86.00
Adirondack Spruce, 2x4", M. ft.	38.00	38.00	40.00
No. 1 Com. Y. Pine Bds., 1x4", M. ft.	45.00	45.00	37.00
Oils—			
Coconut, spot N. Y., lb.	.085	.085	.10
Crude, tks, f.o.b., coast, lb.	.06875	.06875	.08125
China Wood, bbls., spot, lb.	.125	.1225	.135
Cottonseed, lb.	.10	.10	.0975
Linseed, city, raw, gal.	.94	.92	.79
Paraffine wax, ref., 125 m. p., lb.	.035	.035	.035
Turpentine, gal.	1.25	1.26	.68
Paints—			
White Lead, in oil, lb.	.125	.1250	.1225
White Lead, dry, lb.	.0725	.0725	.065
Zinc., Amer., lb.	.07	.07	.075
Paper			
News roll, 100 lbs.	4.00	4.00	4.75
Book SS. & C., lb.	...	.075	.067
Wood Pulp, ton	...	...	80.00
Sugar—			
Cent. 96°, 100 lbs.	4.975	4.90	4.375
Fine Gran., in bbls., 100 lbs.	6.50	6.75	5.75
Wool—			
Boston Aver. 98 quot., lb.	.7155	.7155	.40
Stand. Clay Wor., 16-oz., yd.	3.00	3.00	2.85
Fancy Cassimere, 13-oz., yd.	2.45	2.45	2.25
Serge, 36", Wor., yd.	.52	.52	.52
Broadcloth, 54", yd.	2.75	2.75	2.50
Cottonwarp serge, 36", yd.	.45	.45	.45

Financial

Bank Clearings	Week Ending Sept 9	Week Ending Sept. 2	Year Ago
New York	$3,123,390,128	$3,914,301,413	$2,702,912,777
Chicago	449,615,982	519,034,840	403,634,518
Entire Country	5,841,000,000	6,998,000,000	5,120,000,000
Increase or Decr.	+14.05%	+15.3%	—20.7%
(Per cent of total from preceding year)			

Cost of Money—New York	Week End. Sept. 9	Week End. Sept. 2	Year to Date	Year Ago
Call Loans	4½@4	5@3¾	6@2.75	5½@5
Time Loans (60-90 days)	4½@4¼	4½@4¼	5@3½	6@5½
Six Months	4¾@4½	4¾@4½	5@3¾	6@5¾
Com.Discount,4-6mos.	4½@4	4½@4	5@4	6¼@6

Financial Transactions	Week Ending Sept. 9	Week Ending Sept. 2	Year Ago
Stock Sales, shares	4,336,754	4,772,564	3,103,938
Aver. Price, 25 Railroads	70.33 h. 68.10 l.	69.96 h. 67.45 l.	54.29 h. 53.29 l.
Aver. Price, 25 Industrials	109.37 h. 106.90 l.	108.81 h. 104.54 l.	76.83 h. 73.26 l.
Sales of Bonds, Par Value	$56,511,800	$60,387,950	$55,715,300
Aver. Price, 40 Bonds	82.34 h. 82.22 l.	82.36 h. 82.20 l.	71.24 h. 70.74 l.
Average Net Yield, 10 High-Grade Bonds		4.450%	5.232%
New Security Issues	$14,410,500	$14,750,000	$21,750,000

Business Failures	Week End. Sept. 9	Week End. Sept. 2	Year Ago
Number	329	376	285
	Aug., 1922	July, 1922	Aug., 1921
Liabilities	$40,279,718	$36,900,000	$42,904,409
Number	1,714	1,743	1,562

Industrial

Building Permits	July, 1922	June, 1922	July, 1921
	$188,155,537*	$258,674,449†	$135,327,833*

*149 cities. †141 cities.

Idle Freight Cars	Aug. 15, 1922	Aug. 8, 1922	July 8, 1922
Number	308,270	321,897	423,160
Car Loadings	Aug. 26, 1922	Aug. 19, 1922	July 22, 1922
Number	980,838	856,219	861,124
Steel and Iron Barometer	Aug. 31, 1922	July 31, 1922	Aug. 31, 1921
U. S. Steel Orders (tons)	5,776,161*	5,635,531	4,830,324*
Daily Pig Iron Prod. (tons)	58,586	77,502	30,780
Monthly Pig Iron Prod. (tons)	1,816,170†	2,405,365	954,193†

*End of July. †Month of August.

Foreign Trade	July, 1922	June, 1922	July, 1921
Exports	$305,000,000	$334,000,000	$320,708,574
Imports	251,000,000	260,000,000	179,636,711

Railroad Earnings	Week End. Aug. 26	Week End. Aug. 19	Year Ago
Gross. 15 R.R.	$10,270,028	$10,098,184	•$10,945,368



Stock Market Is Sound

SHORTLY after Labor Day the stock market executed a dip. The entire list of active stocks sold off a point or two, and the cry immediately arose that the bull market was over. The very next day the market turned upward again, and those who had been crying reaction admitted that the time had not yet come.

Such momentary dips are not alarming. They are expected to come every once in a while in a bull market. This one was said by market observers to be the result of realizing sales, combined with a depressing statement printed in an organ of the Standard Oil Co.

When the market recovered the next day the experts pointed out that the market is really in a sound condition. In coming back after a momentary reaction, they said, it was doing what it has always done this season. The financial editor of the *New York Times* saw in the weekly Federal Reserve Report, which came out on the day of recovery, evidence of the soundness of the financial situation.

"The Federal Reserve statement," he said, "which largely embodies in itself the conditions which are supporting prices, showed remarkably little change from a week ago. Rediscounts hardly changed; there was no indication whatever (unless in the $58,000,000 increase of note circulation) that the Reserve banks were being called upon in preparation to finance the autumn trade. Under the pre-war banking system the beginning of September was usually the signal for very large shipments of actual currency from Eastern city banks to the West and South, where increased supplies of ready cash and larger bank reserves were needed as a basis for autumn trade activities. During the war it was a commonplace remark that the Reserve banks were financing the harvest movement. This year not even the assistance of the Federal Reserve is as yet being invoked at all; the private banks are abundantly supplied with credit facilities of their own."

Plenty of Bank Credit Available

SUPPORT for the statement that the banks throughout the country have plenty of credit facilities is found in an analysis of the latest bank call issued by Controller of the Currency Crissinger. The report showed that on June 30 the national banks possessed resources of $20,706,000,000, which was $529,000,000 more than they had on May 5, and $188,000,000 more than they possessed on June 30, 1921. Mr. Crissinger presented some additional figures worth studying:

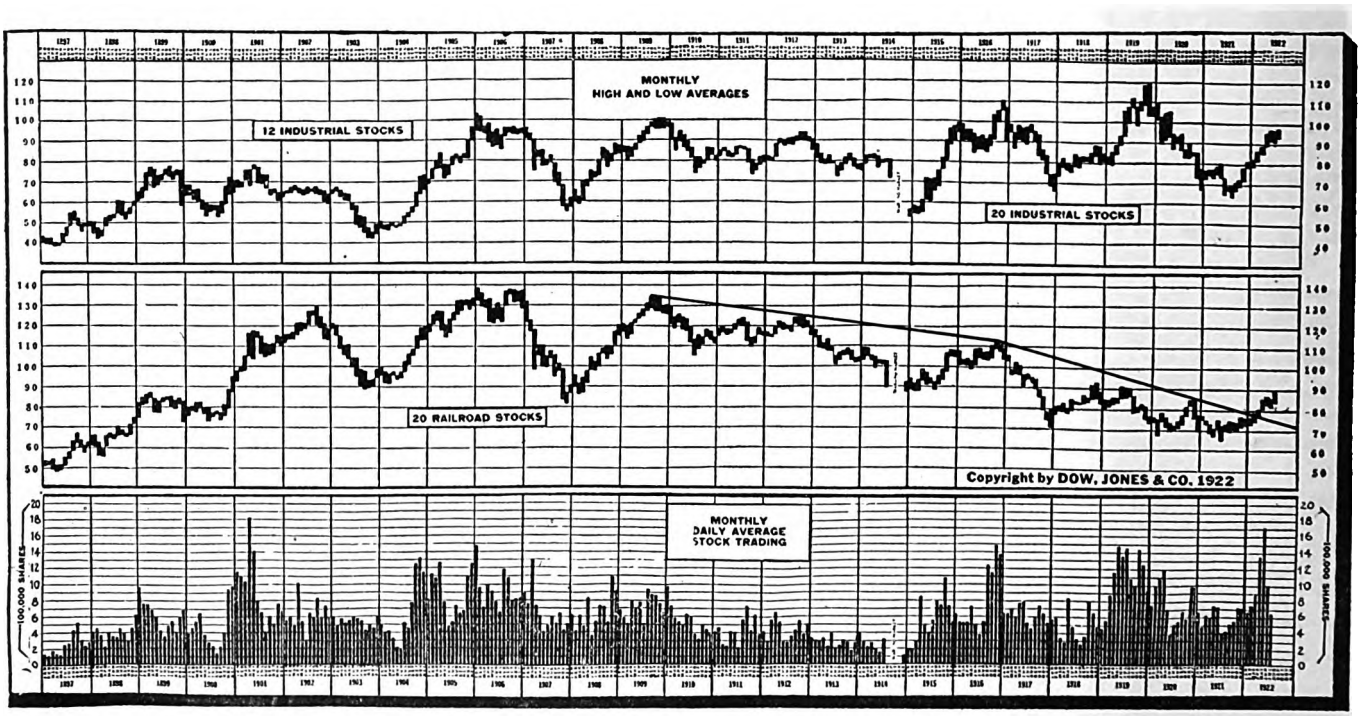
Between May 5 and June 30, resources of national banks in each Federal Reserve district were increased with the exception of banks in the Atlanta district, which showed a reduction of $3,489,000, the amount of increase ranging from $828,000 in the Dallas district to $273,162,000 in the New York district.

Loans and discounts, including rediscounts, on June 30 amounted to $11,248,000,000, an increase since May 5 of $64,000,000, but a reduction since June, 1921, of $756,000,000. Holdings of United States Government securities amounting to $2,285,000,000 on June 30 increased by $266,000,000 during the year and by $161,000,000 since May 5, 1922. Other securities held aggregated $2,277,000,000 on June 30, an increase of $115,000,000 over May 5 and of $272,000,000 over a year ago.

A tendency to carry less cash in the vaults of the banks was reported, the amount of June 3 standing at $326,000,000, which is a decrease of $8,000,000 since May and a decline of $48,000,000 since June last year.

The statement of loans and discounts is a pretty accurate reflection of business activity. The banks have been lending more money since the previous report of the controller, showing that business is a little more active; but they are still below the record of the corresponding period last year. Another fact worth noticing is the great increase in the number of securities held by the banks. This shows that

(*Turn to page 1589*)

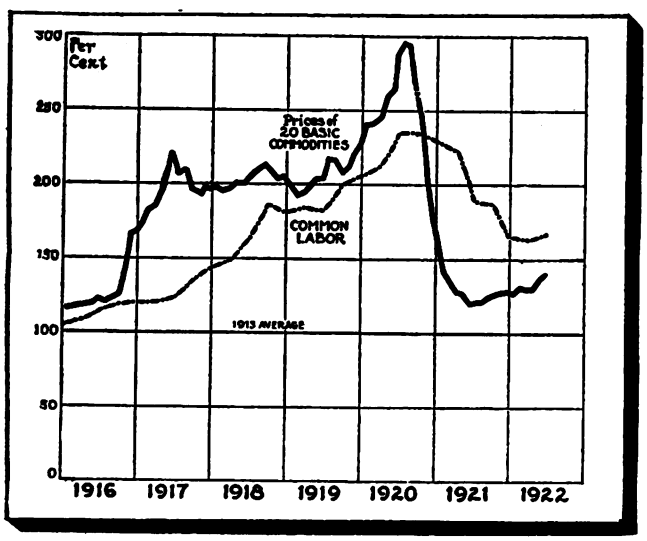


Graphic record of stock movements and stock trading on the New York Stock Exchange during the past quarter century.



26,000 Strikes in Ten Years

IN the decade ending December 31, 1922, the number of strikes and lockouts that will have disturbed industrial America for that period will, it is estimated, have exceeded more than 26,000, or 1000 more than took place in the quarter of a century from 1881 to 1906. More than 60% of all the



Wages of common labor compared with prices of basic commodities; 1913 average=100%.—*(Federal Reserve Bank, N. Y.)*

strikes of the last ten years have taken place in the States that lie north of the Ohio and east of the Mississippi, about 10% of them in territory to the south of the Ohio and east of the Mississippi and the rest in the West.

Among the cities New York heads the list, with 2196 for six years, or an average of 366 a year. Chicago follows New York, but the total for the six years is only 619, or an average of about 104 a year. In Philadelphia the total for this period was 409; Boston, 407; Cleveland, 287; St. Louis, 286; Newark, 212; Baltimore, 201; Cincinnati, 173; San Francisco, 170; Providence, 165: Detroit, 171; Seattle, 163; Pittsburgh, 159; Rochester, 155; New Orleans, 142.

The largest number of strikes called during this period affected the building trades, more than 2700 having been called by the building trades unions. The metal trades union accounted for more than 2600; the clothing industry labor organizations for 2000; the miners for about 1400; the textile unions for 1250; steam and electric transportation for more than 1200, and strikes called by the paper manufacturing, tobacco, furniture, iron and steel workers and lumber unions were in all instances less than 500 and more than 100.

Labor Banks

A RECENT bulletin of the National Industrial Conference Board tells of the development of labor banks in the last two years. Since the Brotherhood of Locomotive Engineers opened its co-operative national bank at Cleveland in 1920, eight other banks, sponsored by labor organizations, have gone into operation in different parts of the country, and 14 or 15 more are known to be in process of organization. The Cleveland bank has been very successful, having started with $1,000,000 capital and $100,000 paid-in surplus, and acquired assets of approximately $14,000,000.

Employment of Children Decreasing

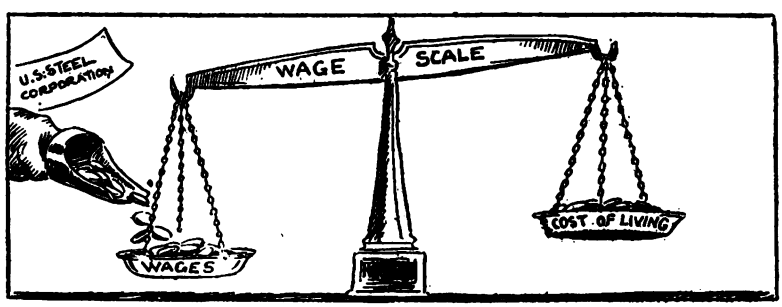
THE United States Department of Commerce reports that the total number of children from 10 to 15 years old engaged in gainful occupations in the United States, according to the 1920 census, was 1,060,858, composed of 714,348 boys and 346,610 girls. The children listed as gainfully employed are comprised of those working on their own account, such as newsboys, and employees working for wages or their equivalent. The boys reported as gainfully occupied amounted to 11.3% of the total of 6,294,985 boys between the ages of 10 and 15 years, and girls 5.6% of the total of 6,207,597 girls within the same age limits. Compared with the census of 1910, the total number of children gainfully employed decreased 46.7%.

Shorter Working Week Established

ACCORDING to the National Industrial Conference Board 55.1 hours constituted the average nominal week in July, 1914. Following a general reduction in working hours during the war period, they declined to 50.7 in June, 1920, and this level remained practically unchanged until July, 1921. At this time a large decline in the hours of the nominal week occurred in the foundry group, so that in July, 1921, the average hours were 49.9. They remained at about the same level until the close of the year, being 49.8 in December, 1921. The average actual week per wage earner, however, showed a decline from 51 hours in July, 1914, to 48.5 in June, 1920. By April, working hours had been reduced to 43.6. The last five months of 1921 showed a revival, so that in December they stood at 46.2. This, it is pointed out, is 2.3 hours below the levels reached at the 1920 peak.

Wage Advance for Glassworkers

THE most significant labor development in the window glass industry recently has been the announcement by the American Window Glass Company of an advance in wages to cutters and flatteners employed in its factories, and the wage conference held at Cleveland, on Thursday, by committees



(Chicago Tribune)

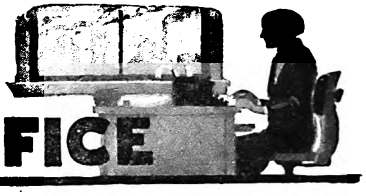
Restoring proper relationship.

representing the National Association of Window Glass Manufacturers and the National Window Glass Workers.

The wage committee representing the Window Glass Cutters' and Flatteners' Protective Association met with officials of the American Window Glass Company and settled wages for the two trades, providing an advance of about 25% in wages, effective from August 26, 1922, to August 31, 1923.



IN THE MANAGER'S OFFICE



About Curtailing Sales Forces and Advertising

THE need of balancing sales and production is discussed by W. A. Grieves in *100% Management*. During the war, and more recently, there was a general disregard of industrial proportion. Producing units were constantly increased without corresponding development of the sources of sale to keep the increased capacity going. Good business in prosperous times will build up reserves to take care of periods of depression; and the sales end of any business, if it is at all efficient, should be the last department upon which to apply cuts. Concerns that during the past few years built up a tremendous capacity for producing goods have foolishly reduced their salesmen and advertising to a point of more than diminishing returns.

The responsibility of a sales organization does not rest with the management alone. The man in the factory has a right to increased and intensified effort on the part of the sales department in times of depression, just as the sales department demands overtime work on the part of the factory during the peak load when orders flow in without much effort on the part of the sales force.

The Need for Departmental Cooperation

EACH branch of a business is responsible for the success or failure of every other, according to W. S. MacArthur in *100% Management*, and office and administrative functions must be accorded their proper place in the industrial scheme. These departments have not kept pace with production and sales methods and will not unless those responsible for their effective functioning realize that co-operation between the various industrial divisions is absolutely essential to the proper and profitable conduct of any organization. This condition arose at a time when cost systems such as we now know were practically unknown, when, income, federal and corporation tax matters were unheard of, and the profits of the business were gauged by the cash left on hand after the bills were paid.

The expansion of business, however, brought about a change of view in this respect. The change from an industrial situation where any method or system passed to a condition where the best and most scientific methods are an absolute necessity has given the average department head and production man a new and wholesome respect for the administrative and accounting branches and has brought home the fact that the production and sals departments cannot operate successfully without the co-operation of the other departments.

The Orderly Handling of Materials

THE routine of material control centers in the safe and orderly handling of goods and this requires their identity, location, safe housing, arrangement, etc. The stores department must preferably not issue anything without a properly signed requisition. Whatever exact procedure is adopted, the guiding principle should be a control of the quantities of material to be issued upon a given job or to a particular department. Otherwise the factory will draw in excess of requirements to cover spoilage.

The following typical steps in the routine of controlling material are given by the Fabricated Production Department of the United States Chamber of Commerce:

(1) The executive responsible for the ordering of material makes out a regular purchase requisition. (2) The purchasing department writes out a purchase order, a copy of which is sent to the stores department for filing in the receiving room. (3) Material is received in the receiving department, loads are checked, the material is unloaded, opened, counted, inspected, recorded against proper purchase order, the material is removed to the proper stores location and proper receiving bin location and material ledger entries made. (4) Material is issued to the various departments on presentation of authorized requisitions, proper bin tag deductions made, and issues of material sent to the cost department for purposes of cost allocation. (5) Material is from time to time scrutinized, counted and checked with stores records and the shortages reported to the purchasing department.

This checking will be particularly valuable in disclosing material for which there is infrequent demand and the supply of which can be curtailed. By the application of this principle to finished stock, the perpetual inventory records of one manufacturer showed at a glance that he was carrying 17,000 items, of which only 600 were active, and he proceeded to eliminate most of the slow-moving items.

The Efficient Purchasing Department

H. J. WHITTEN, in *Administration*, directs the purchasing agent's attention to the three things which the management has a right to expect from an efficient purchasing department: (1) Highest possible value received for each dollar expended. (2) Efficient service rendered to the production department. (3) Maintenance of the firm's prestige in the business community by building up the good-will of all the interests with which the purchasing department ordinarily is in contact.

Good Practice in Record Keeping

ADEQUATE and accurate records are one of the essentials of scientific management, but the wide variety and complexity of systems offered has served to overburden or render inadequate the files of many concerns. The dividing line of good practice is often hazy. S. A. Peck in *Industrial Management* offers a practical plan which is not laborious to install or maintain:

Three major divisions arise in all records: (1) Routine, repetitive records. (2) non-routine, non-recurring records. (3) Standard practice records. Under (1) come the periodical reports of production, costs, personnel, sales, etc.; under (2) reports on tests, investigations, analyses of costs, sales engineering, etc., and under (3) the written instructions covering methods, rules and regulations governing the management of offices and factory.

Class 1 records lend themselves to such a variety of subdivisions that it is useless to attempt to lay down specific rules for their systematization. A good general rule to follow is to keep all summaries and charts covering a period of a week or more and to make a practice of discarding once a year all other routine reports.

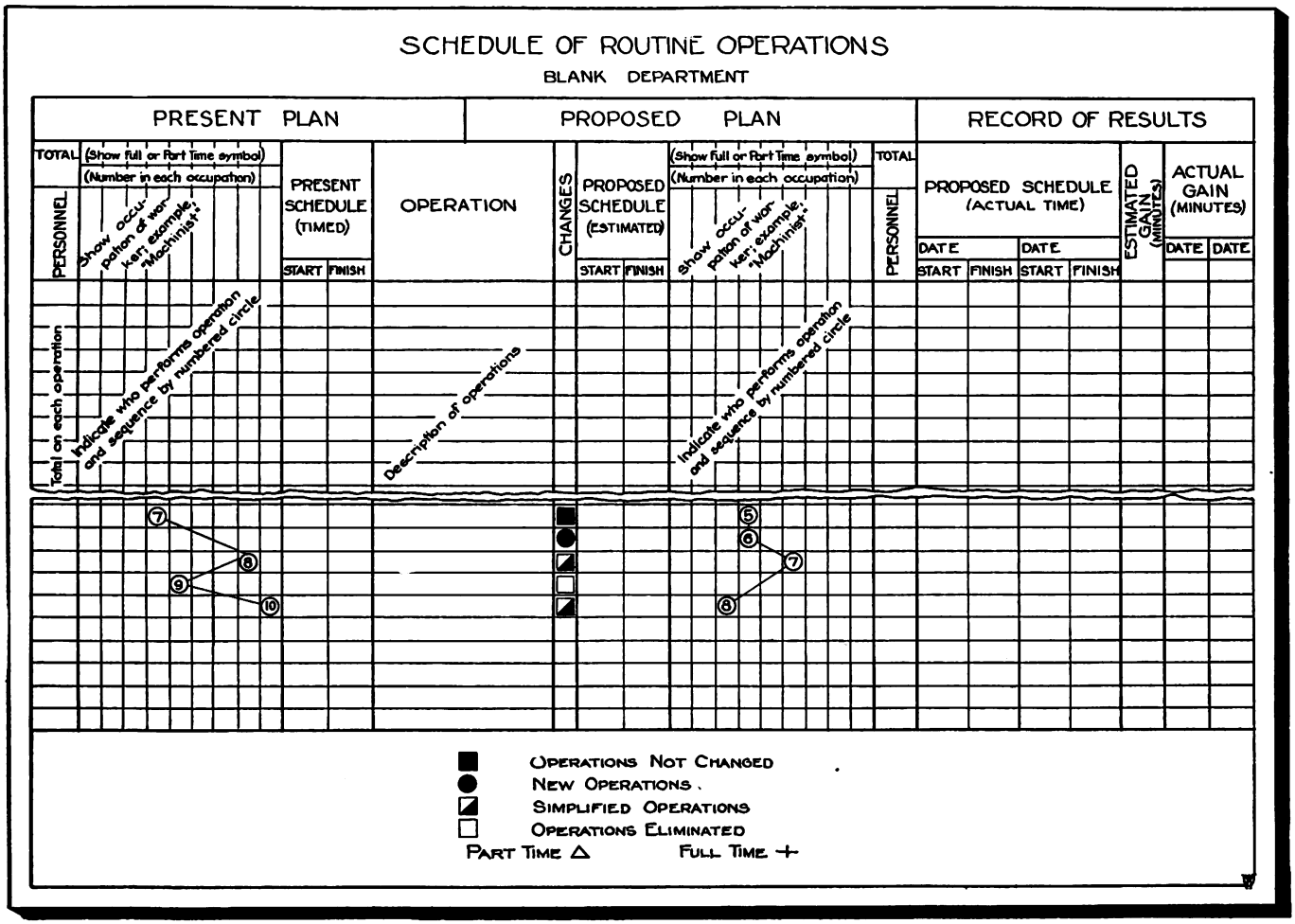
Class 2 records should be particularly itemized to cover all reports on tests, investigations, experiments, inspections, methods, copies of shop paper, etc. Class 3 should be specifically defined as standard practice instructions covering: policies of management, methods of management, methods of operation, methods of control, rules and regulations, duties of executives, department heads, clerks, etc. It would be convenient to call Class 2 records the "information file" and Class 3 records the "standard practice file." Matter in the standard practice files becomes obsolescent at times and this file should be divided into "active" and "inactive" sections.

The information file itself is composed of three sets of 8½ x 11 cards: (a) Alphabet guide cards; (b) numbered folders; (c) index cards. These index cards do away with the separate card file and present a much more convenient method for finding material in the file. They are either lettered or named, depending on the amount of material under any one caption in the file. Thus, under "T" the index cards might be headed "T," "Tests," "Tools" if a great many reports on tests and tools were in the file.

The standard practice file is similar to the information file, except that instead of lettering the guide cards they should carry the department name.

The total number of workers on each operation is indicated in the "personnel" column, while over the occupation columns are shown the number throughout the department assigned to that occupation.

A casual study of the "present plan" portion of the form will often reveal wasteful or inefficient routing. Based on a careful study of the requirements of each operation a new routing plan is formulated and plotted on the chart. Thus far the main consideration has been the assignment of operations to occupations and their sequence. The use of the schedule columns may result in cutting down the time on the operations themselves and thus increase gross production. If



Routine of Operations Chart

A useful form for the study of repetitive operations which not only sets up a schedule but fixes responsibility for its accomplishment.

As a precaution to avoid mixing information file and standard practice matter, two different forms should be designed, using one color for information and another for standard practice.

How to Check Up Repetitive Operations

THE schedule of routine operations chart shown on this page illustrates a convenient means of analyzing existing operations, introducing modifications and checking the results accomplished.

The different tasks are listed in the "operation" column in the order in which they occur, and the person who performs the operation is indicated by a circle under the proper occupation and opposite the description of the operation. When all operations are listed in sequence with their proper circle, lines joining the circles form a personnel routing diagram which traces the path of the material through the shop. one item of material is being traced through the shop, and the route is repetitive each day, or more frequently, the "start" and "finish" columns show the actual time. If the operation does not necessarily occur at any stated time the "finish" column may be used simply to record the number of minutes required for each operation. Changes in assignment, personnel involved, or length of time of an operation are indicated by the symbols shown and serve to contrast the two methods.

The "record of results" is intended to be used as a check-up at two intervals after the new method is installed. If the first date is made three months and the second date six months after the change a very fair estimate can be made as to the actual results which the plan has accomplished. The form of this schedule may be altered in a variety of ways to suit particular conditions, but the principle is applicable to almost every study of operations in office or shop.

EXPORT · IMPORT

Automotive

ALTHOUGH gasoline-driven motor boats and marine engines of American manufacture enjoy the same high reputation as other American automotive products they are said to have reached only a small number of potential purchasers in foreign countries. An analysis of foreign markets shows that Latin America offers excellent prospects for both boats and engines, while in the Far East a most remunerative market for marine motors can be developed. Reports from the Orient indicate that a large portion of the potential markets has not been properly developed, the reasons being: Exclusive territories too large to be taken care of by one importer; agencies entrusted to other nationals who were willing to take on American products during the war when they were unable to secure similar European lines and who are no longer giving proper attention to the American merchandise; representations in the hands of large concerns who handle numerous other lines and who limit themselves to exhibiting samples in their show-windows or on their shelves instead of using intensive sales methods.

Iron

AS a result of the increasing domestic demand for steel, American mills have almost wholly dropped out of the export market for the time being. The United States Steel Products Company is quoting on plates, shapes and bars and a few other products, but only for deferred deliveries and are entirely out of the market on wire rods. Independent companies are doing practically no quoting. It is pointed out, however, that American mills are not losing a great deal of foreign business through their inability to ship, because the demand from abroad is decidedly limited in volume. Japan is the principal buyer, but its current requirements are not large.

Leather

THE leather boot and shoe export trade of the United States during July, 1922, amounted to 388,928 pairs as compared with 623,548 pairs in July, 1921. Although the export trade in men's shoes did not equal that of the corresponding month of the previous year, yet there are several encouraging features to be noted this month. In July of 1921 no men's shoes were exported to Denmark, but this year 647 pairs went to that country. The trade with Canada increased from 3,593 pairs to 4,077 pairs; with Newfoundland and Labrador from 922 to 3,228; Jamaica from 1,186 to 11,344; Cuba from 5,065 to 44,107; and with the Philippine Islands from 410 pairs to 2,695 pairs. Exports of women's shoes during July showed an increase of 53.3% over those for July, 1921. The most notable increases were in the shipments to Jamaica, Cuba, and the Dominican Republic.



(Omaha Bee)

They'll soon have enough to pay an installment on that debt.

Rubber

COMPARING the figures of the United States rubber exports for the first five months of 1922 brings out some interesting facts, says *India Rubber World.* As the total exports for this period were $14,264,931, the figures for the year at this rate should reach about $32,000,000 which would be a little more than last year's figures.

Exports also for these five individual months of 1922 reached the highest point in March, when sales for that month totaled $3,737,063. While April exports showed a considerable decline some advantage was gained in May, although the figures were still somewhat below those of March.

England remains our best customer for pneumatic tires, taking during the first four months of the year tires valued at $1,192,947. American belting is also well established in England and appears to be preferred when it can be obtained, on account of its superior strength and utility, although it is sold at a price very much higher than British belting. There is also quite a large demand here for linings, clutch rings, clutch facings, and similar automobile goods, as the Birmingham district is one of the centers of the motor car industry in England and is interested in the sale of American cars and accessories.

Sugar

SUGAR exports for the first five months of 1922 exceed 1,000,000,000 pounds as compared with about a quarter of this amount for the corresponding period of last year and an average of only 30,000,000 pounds for the pre-war period 1910-1914. This enormous demand for sugar appears to confirm the statement made by the Department of Commerce in January that the world sugar stocks were low and that not only the large surplus of old sugar held in Cuba would be absorbed, but the new crops as well. The rapid distribution of the Cuban surplus since the beginning of the year is shown by the export figures for the first seven months of 1922 and the United States exports for the same period. Cuba exported 4,000,000 tons, including practically all its old-crop sugar, as compared with 1,800,000 tons for the first seven months of 1921. Of this the United States imported 3,000,000 tons and Europe 800,000 tons, as compared with corresponding figures for 1921 of 1,540,000 and 160,000 tons. The United States exported 755,000 tons of refined sugar in the first seven months of 1922. Sugar is being exported from

the port of Philadelphia in large quantities to England, Germany, and other European countries. The exports during June totaled 64,195,400 pounds, which is an increase of nearly 10,000,000 pounds over the previous month.

Textiles

ALTHOUGH the shipments of raw cotton from the United States for the first seven months of 1922 were slightly under those for the corresponding months a year ago, actual values increased more than 25%. An improved demand for cotton yarn is also noticeable. The extension of cotton manufacturing into foreign countries is increasing the demand for cotton yarns. Shipments of American cotton yarns in 1921 went to more than half a hundred separate markets, Argentina, Canada, Hongkong and Chile being the leaders.

The quantity of cotton cloths exported from the United States in the fiscal year just ended showed a material increase over the preceding year and a big gain when compared with the pre-war average. The quantity exported in the year ending June 30, 1922, was 613,000,000 yards against 556,000,000 in the preceding year but it is pointed out that the 1922 value was only $77,000,000 against $141,000,000 in the year preceding. The quantity exported increased 10% while the value declined 45%, as the average export price of the cloths sent out of the country in the fiscal year 1922 was 12.5 cents per yard against 25.4 cents in the fiscal year 1921.

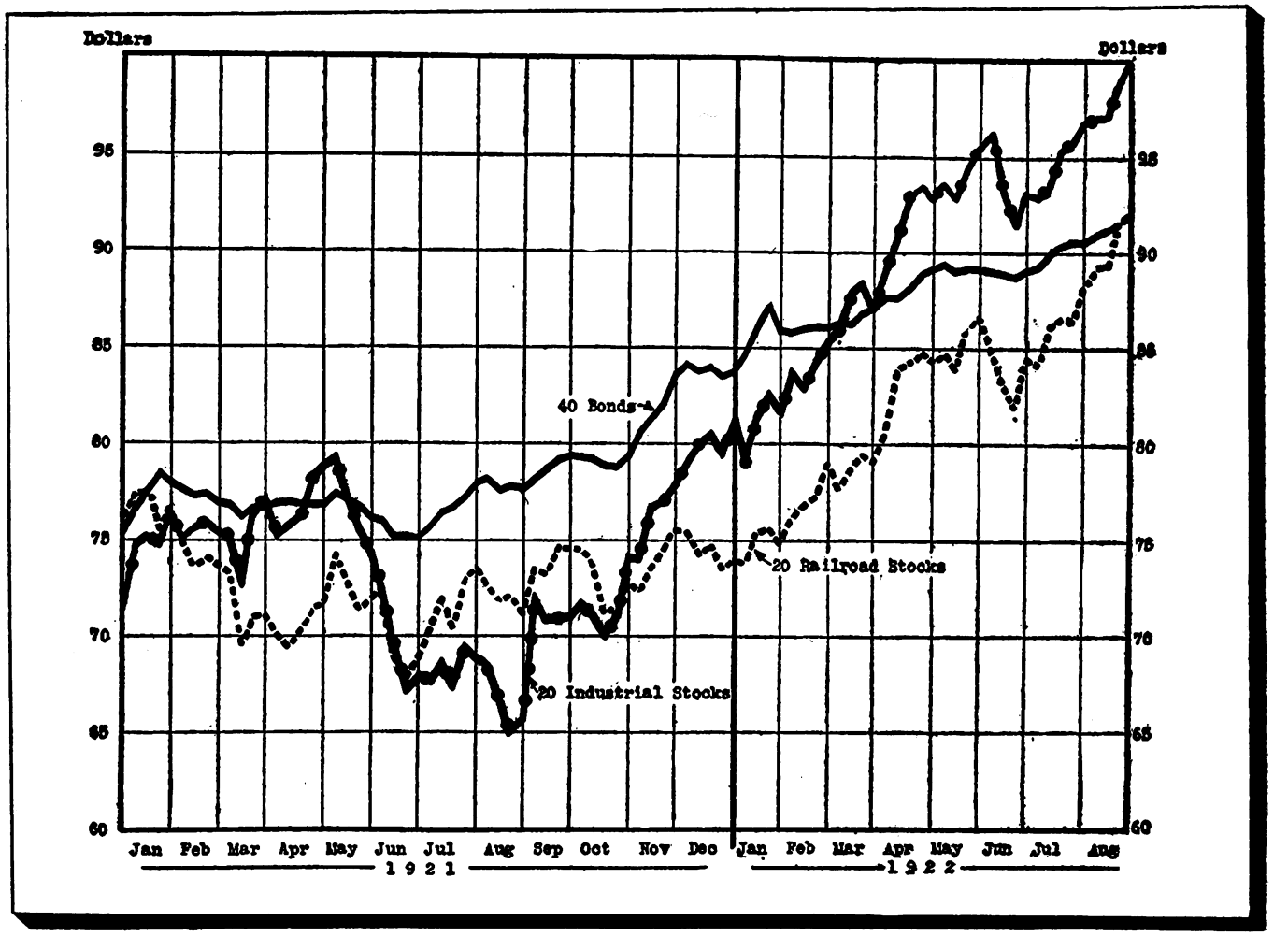
The chief increase in the quantity exported in 1922 was the result of orders from the Orient. To Asia and Oceania as a whole the exports of the fiscal year, 1922, were 162,000,000 yards against 96,000,000 in the preceding year to Europe.

Exports of knit goods in the month of June, official figures for which have been issued, are reported to have shown increases in every branch except cotton hosiery in which there was a slight falling off compared with the May figures, although even in the latter case, exports were greater than for any months since December, 1920.

Inter-Continent Air Service

A GROUP of capitalists has submitted a scheme to the British Government for using five lighter-than-air airships for a weekly passenger service to Australia and India. A new carburetor, using gasoline or oil combined with hydrogen, is a factor adding strength to the feasibility of the scheme. This will permit the shipload to be increased 40%. The journey to Bombay would be reduced to 5½ days and to Australia to 11½ days. The fares would be 85 pounds to India and 130 pounds to Australia.

A Year of Rising Security Prices

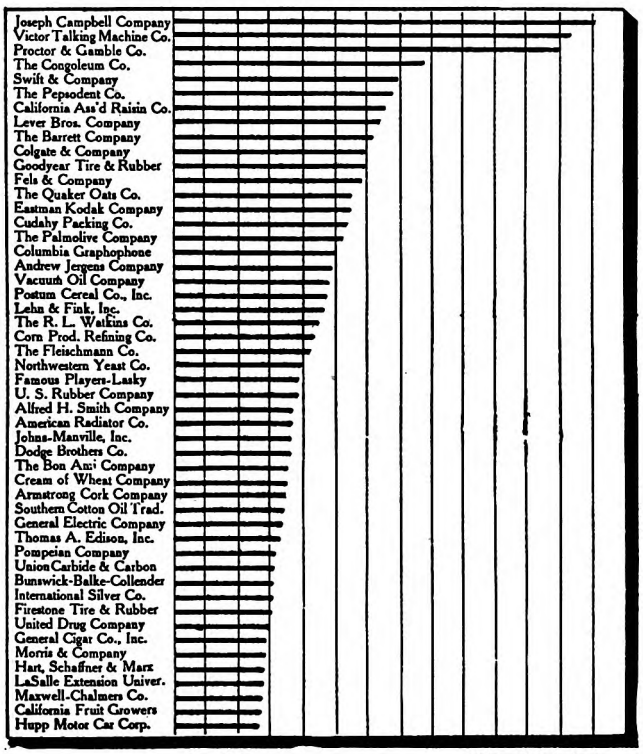


The chart shows graphically the course of the average prices of forty bonds, twenty railroad stocks and twenty industrial stocks, since January 1, 1921. That recovery in bond prices during the last half of 1921 continued at a somewhat slower pace during 1922 is clearly apparent. Even more striking is the long continued advance in the quotations for industrial stocks which began a year ago and has continued with only a slight reaction just after the first of the year and a set-back of more importance during most of June. The railroad stocks made their low in June, 1921, some two months earlier than the industrials, and their advance also has been only twice checked by important reactions, the first in October, 1921, which was accompanied by only a slight recession in the price of the industrials, and the second coinciding exactly with the break in the latter in June of the current year. During the last eight months the prices of rails and industrials tend more and more to move together, even minor reactions occurring simultaneously in both groups. The freeing of the railroads from Government control has tended to increase speculative interest in this class of securities.—(*New York Evening Post.*)



Bank Advertising

CONTINUOUS advertising by means of newspapers, magazines, and direct-mail is certain to bring results to any financial house, according to Edwin Bird Wilson in the *Banker-Manufacturer*. It is pointed out that the proper way to use the newspapers is not always considered carefully by bankers, and that too many of them rely upon so-called "free puffs" to bring their institutions to public attention through the newspapers. In other words, they have "placed undue importance upon the spasmodic mention of their name or their bank's name in the news pages and too little importance on the exceedingly far greater value of interesting, paid-for, honest, frank, look-you-straight-in-the-eye advertising in the same pages."



(The Optimist)

The fifty leading advertisers in the thirty-six principal magazines. (Vertical rules represent $100,000.)

Testing the Trade-Mark

THE power of a trade-mark to suggest or identify goods is representative of its worth, in the opinion of F. B. Knight in *Advertising and Selling*. In discussing the question as to why some trade-marks are known, and others relatively unknown he offers the following suggestions:

1. If a trade-mark appears often enough it may become generally known irrespective of its merit.
2. Trade-marks vary enormously in interest value. This means that some trade-marks are easy to learn; others are hard to learn.
3. The psychology of interest and attention operates in trade-marks just as surely as it operates everywhere else, as in stories, movies, the drama, architecture, and people.
4. Denial of the practical use of laboratory method in the construction, criticism and rating of trade-marks is not supported by the facts.
5. Just as advertising copy should be (and often is) put on the grill in a psychological laboratory to determine answers to such questions as these:
   a. Is the reading difficulty of the copy within the powers of the average buyer?
   b. What sentences are so long or unclear that they form a barrier to finishing the reading of the copy?
   c. Does the main association of the "flow" of the copy follow the natural order of thought?
   d. What words, especially adjectives and verbs, fail to carry maximum descriptive power, vitality, and pleading connotations?

It is pointed out that just such questions as these are asked about advertising copy and that there is no reason why similar scrutiny and analysis should not be expended on trade-marks before giving them the responsibility of representing a manufacturer's product.

Selling Utility Products

A GREAT deal of the money spent on luxury and enjoyment can be diverted into the buying of conveniences and comforts, provided they are sold properly, is the opinion of a writer in *Printers' Ink*. In a bulletin recently sent out to his salesmen by the sales manager of a large concern in the household appliance field, the statement is made that almost as much money was spent on sodas and soft drinks last year as on light, heat and power; and that more money was spent by women during the same period on jewelry, perfume, silk stockings and luxuries than for light, heat and power. But according to this bulletin, the difficulty is that we think of a cleaner, a washer or an ironer in the terms of the total purchase price. To the customer who feels she cannot afford to buy picture the expenditure not in monthly terms, but reduce it to a daily basis. It is believed that this is an idea that manufacturers of so-called necessities have not as yet developed in their sales campaigns—the pricing of their commodities by the day or use.

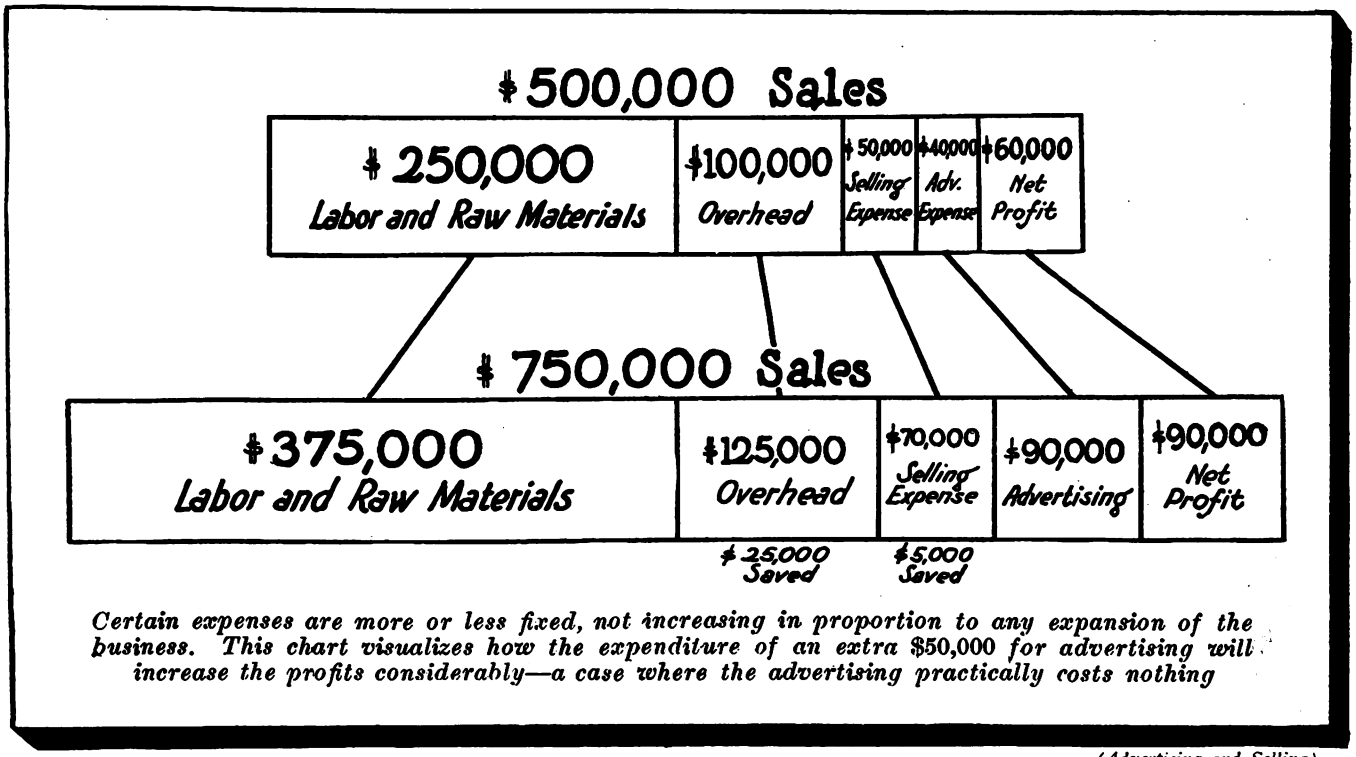
The Value of the Trade Character

THE chief reason for the collapse of trade character in advertising, according to C. B. Larrabee, in *Printers' Ink Monthly*, is to be found "not in himself . . ., but in the minds of the advertisers." When it was the fashion to adopt a trade character, almost every advertiser did so. When one character made a spectacular success, every other was expected to do likewise. Gradually advertisers came to look upon these little people as real salesmen. But it is pointed out that even such familiar characters as Phoebe Snow, the Campbell kids, and Velvet Joe can't argue. They can't beard the purchasing agent in his den or the business man in his dressing room.

The trade character must grow slowly and develop consistently, but as he grows his power increases. After he has been used for a period of years he becomes an increasingly valuable ally to your salesmen. If a trade character fails, don't blame him. Blame the men who have used him, and who have either been unwise in their choice or half-hearted in their employment of him.

The Possibilities of the Chain Store

THE number of economic tendencies pointing to the approach of an era of standardized living is believed to increase the importance of the chain store. Theodore H. Price, *Forbes Magazine*, is of the opinion that as cities grow, chain



Certain expenses are more or less fixed, not increasing in proportion to any expansion of the business. This chart visualizes how the expenditure of an extra $50,000 for advertising will increase the profits considerably—a case where the advertising practically costs nothing

(Advertising and Selling)

See digest below: "What a Manufacturer Should Know Before Advertising."

store distribution will become increasingly necessary. In advertising, the chain store possesses a marked advantage over the small retail store because of its ability to advertise in a higher grade medium. While the chain store is beginning to buy space in the big metropolitan newspapers, the small retailer serves only a certain district and so cannot afford to pay the rates charged by newspapers covering the whole city. His advertising is restricted to circulars and to window displays. On the other hand, if the chain stores are sufficiently scattered practically all the circulation of the newspaper is valuable to them. They advertise uniform sales. Here again they do not pay for waste. Chains are just realizing this. It has been a traditional policy for them to advertise little. Now in medium-sized and even in some large cities they are frequently large advertisers at a cost per sale far below what the individual storekeeper can obtain.

A chain with five to 50 stores in a city receives from five to 50 times as much value from an advertisement as would an individual store. If the individual store spends 2% of its gross for newspaper advertising, the chain with 50 stores can get the same results for an expenditure of 1-50 of that amount or 1-25 of 1% of its gross.

"Another factor," says Mr. Price, "is that centralized warehouses, so important to many chains, can be operated at lowest cost where the number of branches to be served is greatest. The unit store can be reached more efficiently by truck, reducing minimum investment and increasing turnover."

A prominent official of a retailers' association believes that "whether the co-operative marketing attempt among competitive retailers is successful or not, the time is not far distant when such a method will become absolutely necessary to the local retailer and especially the small men."

What a Manufacturer Should Know Before Advertising

IN the opinion of Charles W. Hoyt, writing in *Advertising and Selling* for September, an advertiser can plan in advance the results that his advertising will accomplish if he designs this advertising with a full knowledge of conditions.

The following five fundamental points should be considered in detail—(1) Organization of the manufacturer. (2) The product. (3) Demand. (4) Distribution. (5) Competition. Under organization there are four things to be considered: Production, sales force, finance, relations with customers.

When the product is considered the following questions should be asked: Is the product good enough? Does it meet a genuine need? How does it compare with competitors' products as to price, quality, etc.? Does the public have to be educated to use it? What are the arguments that will make people buy?

In studying the demand the manufacturer must determine whether this goal is in line with the total possible demand for a product like his. He should endeavor to ascertain what determines the demand? Is the demand for the product affected by style? Is it affected by the season? For example—electric fans sell in June, July and August, but you can hardly give them away in January and February.

It is pointed out that many products that have been considered seasonal sellers have, through the power of advertising, been able to lengthen the selling season and secure a more balanced all-year round business. Take the monthly sales of any business and draw a line or graph to show each month's sales, and you will see a chart of peaks and valleys. One of the greatest things that advertising does is to raise up the valleys and level off the peaks. This is particularly true of year-round advertising.

In deciding on the method of distribution a choice should be made of the following five methods since these are the only methods available to any manufacturer:

(1) He can sell direct by mail from factory to factory.

(2) He can use canvassers to sell the consumers.

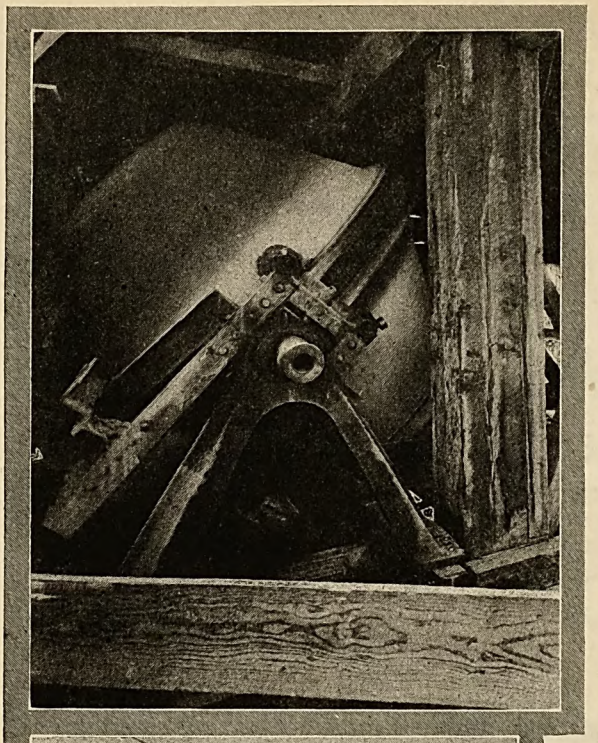
(3) Facilities of a manufacturer's agent may be used, he in turn distributing to the jobber or retailer.

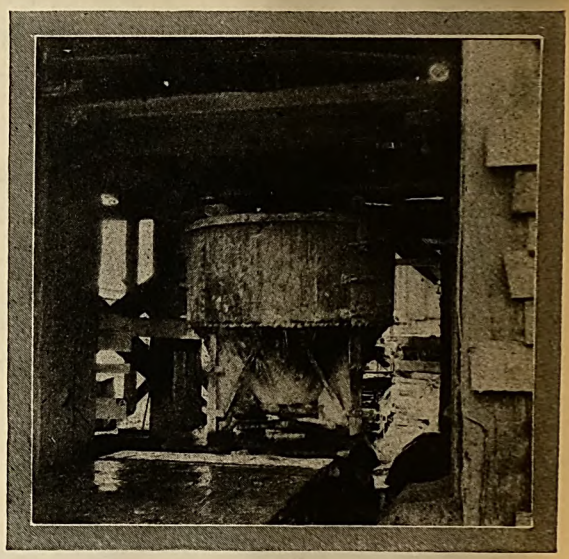
(4) He can use wholesalers who will in turn sell the retailer.

(5) He can sell through the retailer direct.

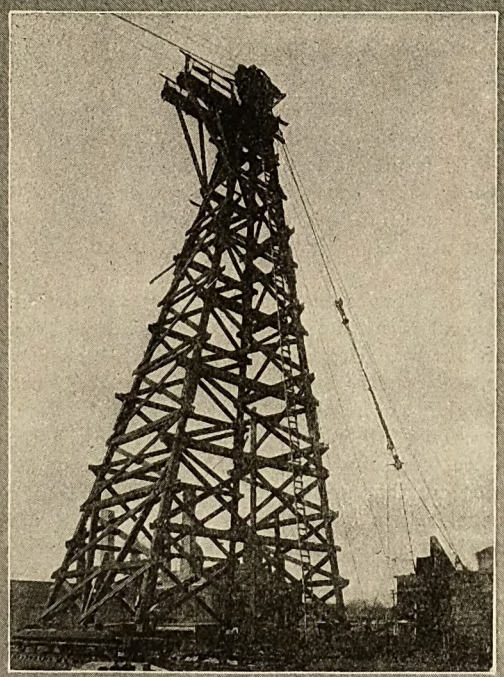
Above all the manufacturer must thoroughly know the situation with regard to his competitors. What is their strength? What have they done in an advertising way? What do they offer the retailer and the consumer that he is not able to offer, or, on the other hand, what does he have to offer the retailer and the consumer that his competition cannot duplicate or surpass?

How Detroit Poured Its Concrete Filter Plant





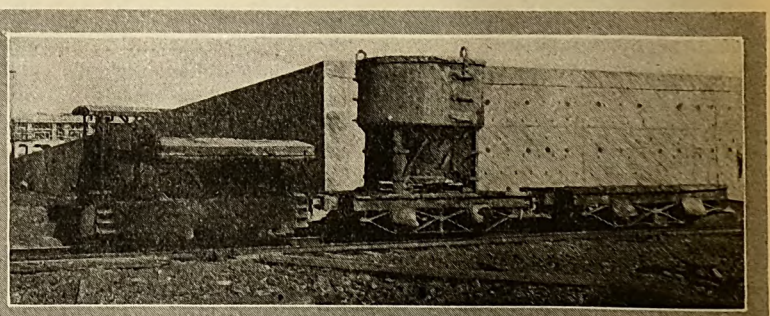
Process pictures of the sub-structure of the Detroit filter plant are shown on this page. Cement and aggregate were mixed in one of the huge rotary mixers shown in the upper left corner at a distance of about 1000 feet from the work. The concrete was poured into great 5-ton buckets and transported on rails by gasoline locomotives, seen below. Specially designed cableways, shown at the left, were used to place the concrete and to handle shop constructed forms in large units, piping and reinforcing. In this way 50,000 cubic yards of concrete were placed in four months.

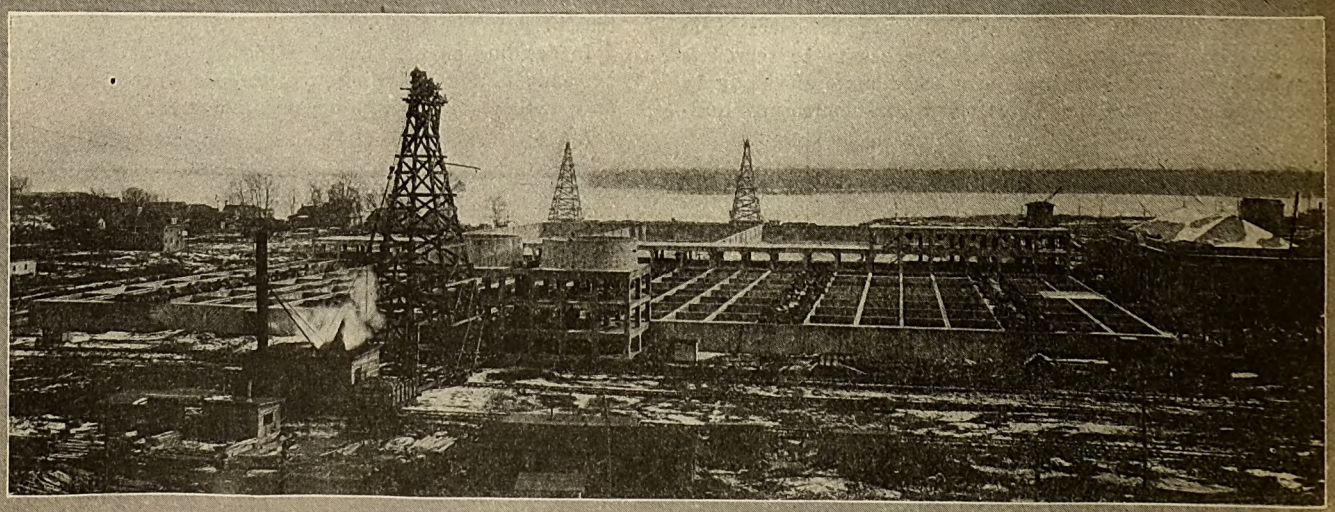


The rapid rate of concreting was due to a careful scheduling of all operations. Forms and steel were always in place on time, insuring the continuous concreting operation.

A panoramic view of the nearly completed sub-structure is seen at the bottom of the page.

(Photos courtesy Thompson-Starrett Company)





AUTOMOTIVE

Efficiency of Motor Transportation Proved

CONVINCING evidence of the increased use of the motor truck is furnished by the recent proposal to link all large cities in the United States by trunk highways. The Associated Highways of America, representing interstate highways, plans to have a national trunk system that will connect the three largest cities in each State. Many medium-sized cities and towns along the route would also be included, with a resultant saving in time in the shipment of many manufactured products. The National Automobile Chamber of Commerce estimates that there are 935 motor truck lines now in operation. It is believed that a trunk system for the entire country is not only feasible, but is becoming a necessity.

The extent to which the motor truck is being used at present is indicated by reports from various cities where this method of transportation is in use. Less than 3% of the milk that is brought into Cincinnati is transported by railroads, even under normal conditions, and milk and produce dealers in the vicinity of Cleveland are reported to be using trucks altogether. Milk coming into Philadelphia by trucks now amounts to 64,169 quarts daily, and it is estimated that trucks operating out of Louisville, Ky., will soon be handling 500 tons of supplies both on the outbound and inbound trips. Under normal conditions the trucks and interurbans handle 75% of all perishable foodstuffs in Kentucky and southern Indiana. The meat packing industry has also adopted motor transportation. Fifteen motor express lines for handling livestock shipments within a radius of 45 miles of Kansas City have been established. Another Kansas City motor line is planning to extend its radius of haul to a maximum of 65 miles.

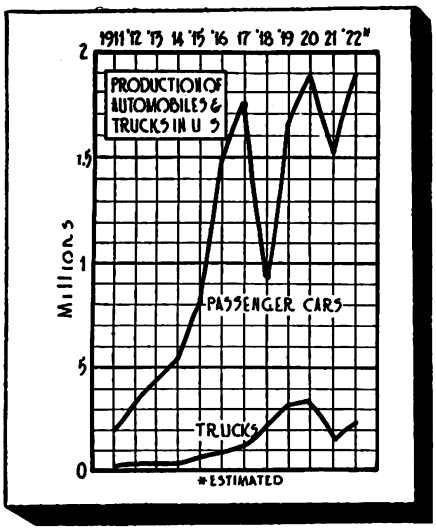
Five completely equipped transport terminals have been established in Indianapolis. Special service on express and all classes of freight can now be maintained between Indianapolis, Chicago, Detroit, Cleveland, Columbus, Cincinnati and Louisville.

Future of Electric Trucks. Discussion of use of electric trucks and reasons why trucks have not been used more extensively in past. Claimed that trucks are properly sold, and that this is real reason for their slow adoption. Opinions of various users of electric trucks are cited to show their superiority to gasoline trucks. J. H. McGRAW, *Central Station*, 7-22. IG.

Mack Truck Frame and Chassis Manufacture. Side frame members of this well-known truck are standard structural channels. Author describes the methods of drilling and riveting these, and the tools and equipment used. Rivets are electrically heated. Also describes motor storage racks, and final assembly of complete truck chassis. FRED H. COLVIN, *American Machinist*, 6-1-22, 800 w. MAH.

Automotive Uses of Asbestos. Half the asbestos used in the United States, the article states, is used in automotive vehicles for brake bands, clutch facings, gasket packings and other parts. The article gives data on all these, on the total asbestos production and consumption, where it comes from, how it is mined and prepared for use, and other interesting and instructive information on the mineral. *Raw Material*, 6-22, 3300 w. MAH.

Compounding the Combustion Engine. This is the discussion which followed the delivery of E. A. Sperry's historic paper at the 1921 Annual Meeting of the A. S. M. E. George A. Orrok pointed out the features of the transfer valve as the secret of the success of the engine, a point which Mr. Sperry himself had not overlooked in his paper. J. C. Shaw doubted the inherent economy claimed for this type of engine and regretted that more detailed operating figures were not presented to prove this side of the case. *Mechanical Engineering*, 8-22, 5600 w. MAH.



Production of automobiles and trucks in U. S., 1911-1922.— ***(Magazine of Wall Street.)***

Alcohol as Motor Fuel. Reasons for decline in use of alcohol fuel in Pernambuco, Brazil, were: fewer gallon-miles of alcohol, diminished power of motor, difficulty in starting, rusting or dirtying of cylinders, destruction of tanks, pipes, valves, etc., by chemical action of alcohol, lack of standard guaranteed fuel mixture, difficulty of supplying large quantities of high-grade alcohol on short notice. All of these difficulties can be eliminated, it is claimed, by using motor specially adapted to alcohol and adoption of standard fuel of proven merit. C. R. CAMERON, *Sugar*, 8-22, 1800 w. CJW.

Light Metal Alloys for Pistons. Although the specific gravity of the light metals remains far below that of cast iron, in the case of passenger-car motors one must expect no saving in piston weight which would be of advantage to the mass equalization. With aluminum alloys this saving amounts to only 15% or 25% and with magnesium alloys to 25% or 35%, but it increases with the diameter. It follows that a material part of the piston weight is necessary for the betterment of the heat conditions. The linear heat expansion of the light metals is twice that of cast iron. Many advantages of the light metal pistons will come to full fruition only if the motors are designed accordingly. When the question of cost and production of the new magnesium alloys have been solved, their scope of utilization will broaden rapidly. For the less important fittings of the motor cars, use of aluminum alloys has made considerable progress. Brass and bronze sheets and plates are used to a great extent in the building of motor cars. The constant tendency to make cars lighter is due wholly to the discovery advent and practical tryouts of the new aluminum alloys. W. D. WILLIAMS, *Raw Material*, 8-22, 4000 w. CJW.

German Shipbuilder's New Departure. The departure consists of the installation of long stroke, slow speed, four cycle Blohm & Voss Diesel engines, this firm having previously been a pronounced advocate of the two-cycle type on the one hand, and of high speed on the other. The ship described is the Rhineland, a 10,000 ton freighter, which has made a very successful trip from Hamburg to East Asia ports. The article describes both ship and engines, the latter in more detail, perhaps. *Motorship*, 7-22, 2200 w. MAH.

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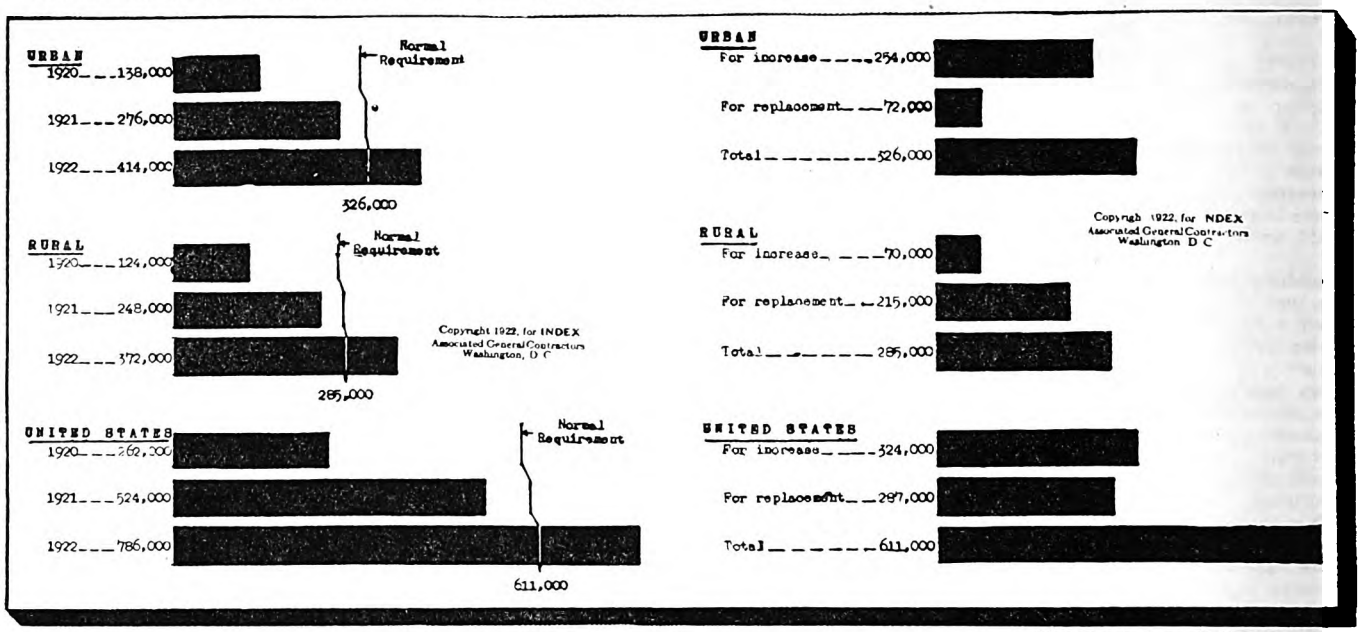


Building Costs Increasing

THE opinion of the leading building papers seems to be that building costs will continue to advance. It is believed that the recent 20% wage increase made by the United States Steel Corporation will have two important effects: First, that it will result in an increase in the price of all common labor; second, that it will tend to increase the prices on steel and on all other metals that are used in construction.

Building Industry points out that the higher wages paid to employees and the increased cost of coal have already resulted in higher prices for cement. *Brick and Clay Record* states that many brick yards are already encountering "pinch" conditions in the matter of fuel, for which exorbitant prices are being asked.

National Builder points out that in New York City, and the East generally, shortage of coal is already a serious handicap, not only in the manufacture of cement, lime and brick, but of window glass. Stocks of window glass are low and it is believed that the fuel shortage will delay the fall opening of the manufacturing plants. As a result, prices are rising and building work is falling off. This publication regards the uncertainties of the present situation as the most discouraging feature and deplores the tendency to temporize and delay the meeting of the real issues. *Engineering and Contracting* believes that the average wholesale prices will rise 30% and that they may even go 50% above the present level, or not far below the peak of 1920. The need for the continuation of above average building operations instead of a dropping off, is emphasized in the chart below.



(Associated General Contractors)

New Homes Built in United States, 1921-1922

Estimated number of new homes; houses, flats, apartments, etc., built during past two years, and to be built this year in urban communities, i. e., places of over 8,000 population, and in the rural area, i. e., all the rest of the country, compared with the normal requirement for new homes to provide for increase of population and for replacement of dwellings torn down or destroyed.

New Homes Needed in United States in 1922

Estimated number of new homes; houses, flats, apartments, etc., needed in urban communities, i. e., places having over 8,000 population, and in the rural area, i. e., all the rest of the country needed to house increased population and replace dwellings razed for various purposes. No allowance is made for deficiencies created by insufficient residential building during recent years.

Law of Interest to the Builder. Right of contractor to abandon contract when owner refuses to pay for extras required by city official upheld by lower and higher courts. Details of case given. LESLIE CHILDS, *Am. Builder,* 8-22, 500 w. CS.

An English View of High Buildings. Town Planning Institute have under investigation proposals to remove restrictions of height of buildings in London. Have given special attention to reports on subject from American cities. Reached conclusions that consideration should be given to climate of London, winter height of sun, intensity of light, mist, humidity, width and direction streets, future development, existing congestion traffic, increased transport facilities, and effect on general health and convenience. Sub-soil not as suitable as New York. Recommend no relaxation at present, and after future form of government for Greater London has been determined that that plan for whole area be adopted and zoning regulations similar to New York be framed. *Architect & Engineer,* 7-22, 1200 w. CS.

Architect's Business Relations with School Boards. Relations between architect and school boards involve both law and business policy. Four phases discussed: (a) selection and appointment of architect, (b) architect's preliminary services to board, (c) legality of architect's agreement with board, (d) agreement between architect and consulting architect. C. STANLEY TAYLOR, *Arch. Forum,* 8-22, 4000 w. CS.

The Progress in City Planning and Zoning. American public beginning to appreciate enormous waste and pitifully inadequate results of unplanned city growth, and decided to use system known as city planning. All the sixteen largest cities have begun comprehensive city planning, fifty-seven of 100 largest cities have definitely taken it up; all told, 150 cities and towns are working on plans. Real estate boards deserve credits for work along this line. Recommends planning commissions of five to nine members, no partisan politics, and sufficient funds. JACOB L. CRANE, *Bldgs. & Bldg. Management,* 7-24-22, 1500 w. CS.

Building Codes Show Great Divergence in Unit Stresses for Concrete. One of most serious difficulties confronting

those who are interested in standardization of building construction is great divergence in unit working stresses for concrete and reinforced concrete fixed by building codes of different cities. Gives comparison of various requirements of different cities and offers constructive suggestions for uniformity. *Architecture & Building*, 8-22, 1500 w. CS.

The New Elevator Code for the City of Baltimore. Account of preparation of code and outline of principal provisions. Considered greatest advance in legislation of this character of any city. Used A. S. M. E. code as basis, two most important features relate to selection and approval of safety devices an dinspection system. *Bldgs. & Bldg. Management*, 7-24-22, 2000 w. CS.

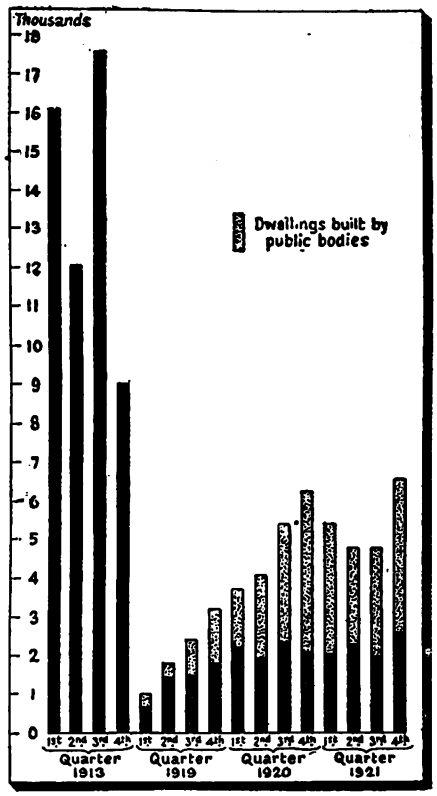
Weather Profits in Building. Weather conditions have big influence on building profits. Gives valuable points on how to make use of U. S. Weather Bureau reports, and character of service rendered. *National Builder*, 8-22, 1500 w. CS.

Design of Safe Construction. Beam stresses are tensile, compressive and shearing, with secondary stresses caused by joint action of three main stresses. Factor of safety is ratio of breaking tensile or compressive stress for the material to actual tensile or compressive stress. Gives diagrams and formulæ covering elements of a reinforced concrete beam. J. F. MANGOLD, *Am. Builder*, 8-22, 1500 w. CS.

Building Efficiency via Pressed Steel. In simplicity of design and ease of erection, metal lumber rivals wood, and when compared with other types of fireproof construction for light occupancy buildings, this material is found superior in its adaptability to exacting conditions of modern building construction. Gives description of various forms and suggestions for architect and builder. A. H. BROMLEY, JR., *Eng. World*, 8-22, 1500 w. CS.

The Sanitation of Bathhouses. Part III. Covers water supply and purification of swimming-pool water. Ideal standard would be to empty, clean, scour and refill pool once every twenty-four hours. Next best condition to admit sufficient hourly flow that contents are changed every twenty-four hours, and in addition empty and clean at least once a week. Covers methods of water treatment; filtration, with hypochlorite of calcium, liquid chlorine, ozone, and sterilization by ultra-violet rays. WM. PAUL GERHARD, *Architecture & Building*, 7-22, 1500 w. CS.

Making Load Tests of a Tile Wall and Measuring Floor Deflections. Description of methods and results of tests on tile wall load tests and floor deflection. EDWARD GODFREY, *Eng. News-Record*, 8-3-22, 500 w. CS.



Net increase in dwellings in 35 principal German towns.—*(Manchester Guardian.)*

Back Plastered Construction. Conscientious architect should have following qualities in mind in building homes: Beauty, durability, low up-keep, resistance to fire, low first cost, low heating cost; regardless of following custom or obsolete practice. Discusses stucco dwellings. Recommends metal lath, attached directly to studs with lath back plastered between studs, stucco mixture being one part cement, one-tenth hydrated lime and three sand, by weights. JOSEPH LOSKEKANN, *Architect & Engineer*, 7-22, 1500 w. CS.

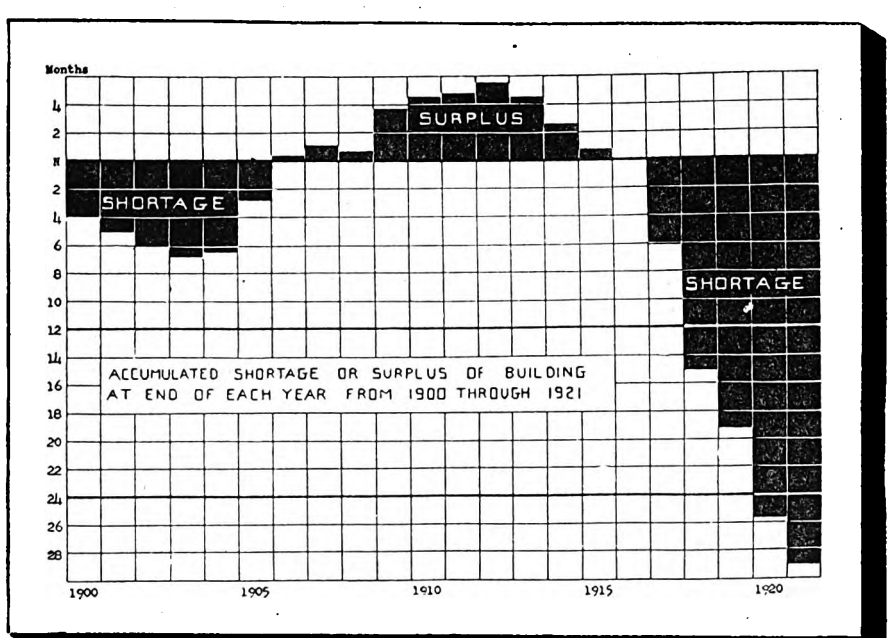
School Building Construction Costs. Discussion of costs of fireproof and semi-fireproof school buildings in various parts of the country. Costs vary from 30 to 55 cents per cubic foot. General construction costs equal 80% total, heating and ventilating 10 to 12%, electrical work, 3% and plumbing 5%. JAMES O. BETELLE, *Arch. Forum*, 8-22, 3000 w. CS.

Special Advantages of Gypsum Plaster-Board Construction. Uniform strength and quality, ease and simplicity of handling, and sanitary and sound deadening qualities are important features of gypsum plaster-board construction. Gives working drawings of construction and description, with comparisons with other materials. Fifth article. VIRGIL G. MARANI, *Permanent Builder*, 7-22, 1500 w. CS.

Slenderness-Ratio and Strength of Concrete Columns. Results of tests at University of Texas on relation between strength and slenderness-ratio of reinforced-concrete columns. Covers: test procedure, round-end tests, buckling, results and graphs. F. E. GIESECKE, *Eng. News-Record*, 8-17-22, 2000 w. CS.

Brick Bonds and Mortars. Fourth article of series, continuation of design of bond pattern units, with some remarks about paving designs. Well illustrated. MONTROSE P. MCARDLE, *Permanent Builder*, 8-22, 1000 w. CS.

Paint Mixing. Whether it is best to use ready-mixed or self-mixed paint depends on knowledge of mixer and circumstances. Covers some of troubles of mixing, and recommends use of ready-mixed paints for most uses. A. ASHMUN KELLY, *National Builder*, 8-22, 500 w. CS.



Shortage or surplus of building by years, 1900 through 1921.—*(American Contractor.)*

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Excellent Prospects for Increased Sales of Paint

THERE are a number of reasons for expecting increased sales of paints this fall. The building boom, with the large percentage of residence buildings, has created an enormous demand for paint. And the need for repairing the rolling stock of the railroads has created another market which is likely to be active for some time to come.

But perhaps more important than either of these is the steady demand for paint that is likely to result from the movement in industry toward efficiency. The campaign conducted by the Eyesight Conservation Council has resulted in impressing manufacturers with the need for eye-protection. They have become convinced that not only for humanitarian reasons but for their own profit, it is necessary to surround workers with the best light obtainable. White or light-colored walls are becoming the rule in a great majority of factories today. Then, too, manufacturers are discovering that it pays to make repairs. The "Save the Surface" campaign may have been responsible for a certain part of this conviction, but another even more potent factor has been the realization that deterioration of buildings erected at the high initial cost that has obtained during recent years would make neglect even more expensive than it has been in the past.

The increased interest in civic improvement is another powerful ally of the paint manufacturer. Throughout the country, cities and towns are conducting "clean-up" and improvement campaigns that are certain to result in a greatly increased demand for paint. Taking into account all these various factors it would appear that the paint and varnish industry may confidently look forward to a busier fall season than it has known for a number of years.

Methyl Violets. Description of various brands of metal violets. Process of manufacture consists of production of raw methyl violet from phenol and dimethylaniline with copper sulphate, hardening and breaking up of the raw product, treatment with milk of lime, saturation with hydrogen sulphide, extraction with hydrochloric acid and purification with salt. Disadvantages of process are given. R. SANSONE, *Color Trade Journal,* 8-22, 1500 w. CJW.

Furfural. Historical survey. Manufactured from corn cobs or oat hulls by action of steam and acid in large rotary digesters. Yield is about 20%. Chemical and physical properties given. Uses in subsequent article. C. S. MINER, *Chem. Met. Eng.,* 8-16-22, 2500 w. CJW.

Electrolytic Mangnesium. Magnesium, its properties, uses and prospective field. Methods proposed and used for its production. Dehydration of magnesium chloride and the two stage electrolysis of the fused chloride employed by the Magnesium Company. Utilization of the chlorine produced to form magnesium chloride and chlorate makes the process efficient as to power and materials. *Raw Material,* 7-22, 2000 w. APS.

Hydrogen Peroxide. Methods of manufacture of sodium, barium and hydrogen peroxides are given. Purest peroxide prepared by electrolysis of potassium hydrogen sulphate or potassium persulphate followed by distillation. Hydrogen peroxide is used in medicine, as a preservative for fish and for bleaching textiles. Water to be used in bleaching process should be tested for possible action on the peroxide. Vessels are usually made of wood. Wool or cotton are bleached in baths containing five grams, straw 20 to 30 grams and horn 30 grams of 30% peroxide per liter. Methods of testing concentration of peroxide solution given. Peroxide should be stored in a cool shed and not exposed to direct sunlight. Pink stains are avoided by the use of peroxide bleach. The speed of bleaching may be increased by increasing the temperature or alkalinity of the bath and by exposure to sunlight. Faded fabrics stripped with hydrosulphite and treated with hydrogen sulphide may be evenly dyed. H. WILSON, *Am. Dyestuff Reporter,* 7-14-22, 3500 w. CJW.

Color in Relation to Dyeing. At the present time there is no clearly understood and definite explanation of how the Magenta affects the white light which it receives, as to send it forth vibrating only with red rays. We only know that it seems to be the "nature of the beast," and let it go at that. For the real purposes of our study the why and the wherefore do not matter so much; our chief interest is in gaining a knowledge of the relations and properties of these dyestuffs in connection with the colors they produce. We have to be content with the fact that dyestuffs are of such a nature that as applied to fabrics they so affect the properties of light as to produce the sensation of colors. To delve deeper into the ultimate causes thereof is more the province of the transcendental physicist than that of the dyer. J. M. MATTHEWS, *Color Trade Jour.,* 8-22, 2000 w. CJW.

Dyeing of Blacks. Most of the union blacks on the market dye wool, cotton and silk about the same shade if treated in the right way. Usually about 6% of the weight of the material is sufficient, with the addition of 15% to 20% Glauber salt or common salt. Temperature of the bath is most important. If the goods to be dyed contain mostly wool, it is advisable to dye the wool first with acid dyes and then the cotton with direct or union dyes. Developed blacks are used for silk and cotton and is the best to employ when fast color is required. A red, dark brown, or yellow garment must have color killed or it will show through black. K. G. ZANDER, *Cleaning and Dyeing World,* 8-22, 600 w. CJW.

Future of Organic Chemistry. Author imagines that future industrial organic chemistry of America will depend upon plant breeding and culture, bacterial action, catalysis, electrochemistry, and new chemical machinery. Most conspicuous of such processes are life processes; it is they that are most efficient. Organic chemistry needs a chemical Burbank. Bacteria will replace many of the present violent, destructive and expensive reactions. Machinery must be improved. Catalytic processes are closest approximation to life processes. May discover substances that will catalyze life processes of plants and bacteria and control their actions in same way that secretions of ductless glands control activities of animal body. Catalysts today present an almost virgin field of work. E. K. STRACHAN, *Chemical Age,* 8-22, 1000 w. CJW.

Specifications for Lithopone Paint. Specifications covering ready-mixed lithopone paints, frequently known as flat, washable wall paint in white and variety of light tints; they shall dry to dead flat opaque coats that will adhere to wood, metal and plaster, stand washing with soap and water and show no material change in color on exposure to light. Officially adopted by Federal Specifications Board, Feb. 3, 1922. Covers method of sampling and laboratory examination as well as reagents used in testing. Bureau of Standards, Circular No. 111 (2nd Ed.), 8 pp. 6-24-22. CJW.

Specifications for Linseed Oil. Composition of linseed oil (raw, refined and boiled) are given, together with methods of sampling and laboratory examination. Officially adopted by Federal Specifications Board, Feb. 3, 1922. Bureau of Standards, Circular 82, 2nd Ed., 6-8-22, 9 pp. CJW.

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GLASS · POTTERY

Improved Outlook for Glass

THE consensus of opinion of prominent manufacturers and jobbers of window and plate glass, according to the *National Glass Budget,* seems to be that demand for these two kinds of glass will continue to be very good for some time to come. It is pointed out that the sash and door mill interests are exceedingly busy and the activity in the building trades, which has been responsible for the increased demand for window glass, will probably continue. A considerable volume of orders for plate and sheet glass from foreign countries is also reported.

The Glass Worker also reports that as a result of building activity consumption of window glass continues at a very rapid rate, and jobbers who are short of popular sizes are now more worried about their chances of getting stocks replenished than about the character of the demand. It is also pointed out that the introduction of windshield wing lights for automobiles has greatly increased the consumption of plate glass. The use of curtain or top lights has had the same effect. Demand for all glass is so strong that some distributors say a shortage of supplies is not impossible.

It is believed that the campaign now being conducted by the plate glass manufacturers of America will greatly increase the market for their product. One of the purposes of this campaign is to increase the use and the sale of the smaller sizes of plate glass. It is pointed out that plate glass is superior to ordinary glass because it is heavy, strong and clear, while it is only a little higher in price.

According to recent estimates, the cost of glazing a $15,000 house with window glass is approximately from $300 to $500, and, when plate glass is used, from $500 to $750. The F. W. Dodge Company estimates that the difference in the cost between plate glass and ordinary glass for the average dwelling is about 50%. This, of course, includes the cost of cutting and setting the plate glass and providing for heavier window sashes. The glass manufacturers believe that it will not be difficult to persuade the owner to make the comparatively small additional outlay for plate glass windows when the improved appearance resulting from its use is considered.

Stained Glass. The concluding article in this series. In this installment is taken up the subject of decorative possibilities of stained glass, illustrated by modern examples. The author says that a stained glass window being part of the wall surface is intended to be looked at and not through. A stained glass window is a "design of colored light." Fine drawing, painting and shading should not be attempted for stained glass windows are not paintings but ornaments. Symbolism rather than pictorial representation is to be attained in stained glass designs. JOSEPH G. REYNOLDS, JR., *The American Architect,* 8-2-22, 3000 w. EMcC.

Manganese in Glass Making. Manganese probably is the best decolorizer that can be used in making pot glass. Niter can be used freely, which in turn allows quick firing of the glass. Quantity used depends upon character of glass, methods of its manufacture, iron content of raw materials and character of manganese used. Higher the temperature, more manganese is necessary. Maximum amount is usually 10 to 15 lbs. Siliceous manganese is not objectionable, but carbonaceous manganese is. Powdered ore is used principally when batch is melted in pots; lump or granular ore is used in tank melting. *National Glass Budget,* 8-26-22, 500 w. CJW.

China Clay Mine. Description of mine and mill of Canadian China Clay Co. The clay is associated with much shattered vertical beds of quartzite rock. Material is loosened with dynamite, trammed to shaft, hoisted to surface and clay separated from grains of quartz and from stray chips. Log washer is sufficient to disintegrate it thoroughly. Flow of water carries fine sand with clay through two series of troughs where sand has chance to settle out. Thickened pulp, after settling, is filter-pressed and dried by steam coils. Compares with some of best imported Cornish clay. That part stained with iron oxide is used as fire clay, but at present most of natural mixture of clay and quart is sold as saggar clay. *Canadian Mining J.,* 8-11-22, 1500 w. CJW.

Lime for Glass. Advantages of limestone over other forms of lime are low cost, constant composition and less objectionable properties as regards handling. Chief objection is amount of heat needed to melt limestone batch. Quicklime is preferred by many because it is less difficult to melt but it is unstable, unpleasant to handle and expensive. Specifications vary with kind of glass. General specifications are: Alkaline earth content not less than 90%; iron content as low as possible, general range being 0.1% to 8%; alumina and silica content is not objectionable; 1% sulfates in limestone and not more than 1% in lime; loss on ignition in line should not be over 3% as shipped; unless otherwise specified, all limestone and lime should pass a 20-mesh sieve. 90% of troubles in glass making due to materials comes from lime. R. R. SHIVELY, *Chemical Age,* 7-22, 1000 w. CJW.

Continuous Tunnel Kiln. This kiln at plant of A. C. Spark Plug Co. has 75 ft. length and interior width of 2.75 ft. Design is based upon idea of firing small thin mass at rapid rate, only 12 hrs. being required for burning operation. Ware, spark plug porcelain insulator, is passed through in single, unprotected, horizontal tier, being subjected to direct fire. Kiln is operated at cone 18 half down. City gas is used, with burner equipment which is modified form of surface combustion. Initial cost is low. Kiln is of simple construction, permitting rapid heating and cooling. Output depends upon ability of individual pieces of ware to safely absorb heat necessary for their vitrification. S. J. McDOWELL and P. D. HELSER, *J. Am. Ceranic Soc.,* 6-22, 2000 w. CJW.

Artificial Eyes. Short portion of glass tube is melted in small flame and drawn out into number of fine little tubes serving as handles. Piece of tube, brought to red heat, is blown into ball-eye ball, and one of handles melted off. Ball touched with drop of dark glass which forms basal color or iris pigment and which is blown out to flat disc of about 6 mm. in diameter. Iris is marked on disc with thin rods of colored glass which radiate from center. Small drop of black glass placed in center produces pupil. Iris is cased with crystal glass, producing cornea, fore part of eye and transition to corium. Veins are traced on white with fine threads of ruby glass. *Glass Industry,* 7-22, 750 w. CJW.

Modern Glass Factory. Ideal location would call for slightly rolling surface near river on ample plot of ground for railroad sidings. Employes should be quartered within short distance of plant. Power may be derived from steam plants or purchased electric power. Since large amounts of water are used, location near stream is very desirable. Discussion of type and size of buildings (plan) and equipment. W. S. MAYERS, *Glass Industry,* 7-22, 2500 w. CJW.

At the ceramic experiment station, Columbus, O., the Bureau of Mines has made standard sized bricks for calcined dolomite and from raw dolomite using 10% of the flux Fe_2O_3, Al_2O_3, SiO_2. Calcined dolomite was found undesirable for making into bricks, as the mud slakes so rapidly, and on account of enormous shrinkage during drying and burning, all samples cracked badly. Raw dolomite, together with 10% flux, gives excellent promise. The bricks so burned to 1450° C. were sound, of high density and have not yet shown signs of slaking when subjected to the boiling test.—*U. S. Bureau of Mines.*

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Prospects for Electrical Industry Encouraging

THE growth of the electrical industry, according to *Lighting Fixtures and Lighting,* is indicated by the 1922 year book of the Commonwealth Edison Company of Chicago, which places the company's volume of business last year at $37,139,830.64 and the number of customers served at 536,982. It is pointed out that although only a third of the homes of the nation are wired, current for illuminating purposes is the greatest factor in the electrical load, and electrical equipment sold leads everything else. Lighting fixtures and equipment constitute 59% of the central station's revenue, 66% of the jobbers' sales and 68% of the dealers' sales.

Dun's Review points out that although competition is keener, sales of electrical supplies are larger than they were a year ago. The two chief factors in the demand continue to be the activity in building construction and the interest in the radiophone. The large amount of home building has stimulated the demand for lighting fixtures and shades, especially the types used in the moderate priced dwelling; there also has been a fair demand for household electrical supplies of various kinds.

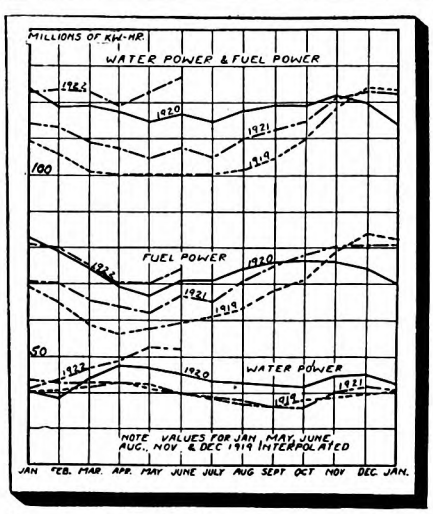
That the central stations are doing only a small part of the business they might be doing if some means were devised for wiring homes more cheaply is indicated by the recent survey of Dr. Luckeish of the Nela Research Laboratories, which disclosed the fact that the middle-class homes of the country are less than half-lighted and that the low-class home is only half as well lighted as the middle-class dwelling. The probable fuel shortage this winter and the need for substitute fuels, is also certain to create a market for electrical equipment for heating and cooking purposes. An additional amount of electrical repair work has resulted from the increase in automobile sales. The prospect for the remainder of the year is generally considered to be extremely favorable.

Another evidence of renewed interest in lighting fixtures is believed to be the appointment of two lighting fixture experts on a committee of the American Institute of Architects. This is believed to be the beginning of real contact between the fixture manufacturer and the architect. Discussing the benefit to be derived from this contract, *Western Canada Contractor* emphasizes the value of having a competent illuminating engineer associated with the architect in laying out and engineering every job the architect may design, instead of leaving the matter to chance, or to the subcontractor. It is pointed out that the science of illumination has been wonderfully furthered by electrical engineers during the past decade and is now established on a firm foundation.

Purpose and Problems of 220,000-Volt Transmission. It is told why transmission of energy at 220,000 volts, which represents the greatest advance of proven practice that could be considered conservative, was chosen for the Pit River system. The various technical problems encountered are discussed. Method of avoiding corona losses. The design of initial 220,000-volt insulators is described. The use of the synchronous condenser effects economies. The economic advantage of the development of 220 kw. transmission is extremely important. The further development of large amounts of hydro-electric power and its economic transmission to the points of use is made possible. The value to a community of hydro-electric power delived at a low cost is almost inestimable, thus 220 kw. transmission insures a continuation of low cost energy for many years to come. J. P. JOLLYMAN, *J. of Electricity and Western Industry,* 8-15-22, 4000 w. IG.

Protecting Alternating Current Motors. Three conditions need be considered: from overload current, which may result from too heavy mechanical load, from abnormal frequency or voltage; from single-phase power and from phase reversal. Description of phase-reversal, open-phase and temperature overload relay given. B. W. JONES, *Power,* 8-22-22, 1000 w. CJW.

Measuring Flow of Heat in Buildings by Means of Resistance Wires. In cold storage buildings it is important to know the distribution of the heat through the building and the flow of the same from one part of the structure to the other. A method of determining the heat flow by the resistance wire principle is described in this article. One hundred feet of No. 20 rubber-covered fixture wire were used for this purpose. The wire was arranged within the area in which the temperature was to be determined. Repeated trials proved that by this method the temperature could be determined accurately within 1° F. The use of two such wires eliminates the effect of that part of the one wire which is not within the area in which the temperature is to be determined. The electrical resistance of the wires is measured and by proper calibration this is translated into degree of temperature. The details of the method are given, including curve sheets, diagram of the way in which the wires were located and fixed, etc., so that it may be applied by those who are interested in it. F. E. GIESECKE, *Heating and Ventilating Mag.,* 8-22, 3000 w. IG.



The increase in the sale of electrical equipment, spoken of above, goes hand in hand with the steady growth in the production of electricity. This chart shows the average daily production of electricity by public utility plants in the United States. — *(Power Plant Engineering.)*

Phasing In and Operating Three-Phase Alternators in Parallel. The practical points on how to phase in alternators are discussed. Two methods are explained. F. C. DEWEESE, *Southern Engineer,* 8-12, 2500 w. IG.

Electric Motor Drive in Steel Industry. Rolling mill requirements as to power, speed, adjustability and changing of speed. Mill layouts to utilize electric power. Discussion of the applicability of electric motor drive for auxiliaries as compared to hydraulic and other mechanisms. GORDON FOX, *Iron Age,* 8-10-22, 3000 w. (to be continued). APS.

Electric Motor Drive in Steel Industry. (Continued.) Mill requirements for constant speed and adjustable speed. Reasons for requiring adjustable speed for some mills. Consideration of the flow of metal under rolling pressure and its effect on power demands. Types of motors and motor sets. GORDON FOX, *Iron Age,* 8-17-22, 5000 w., nuumerous graphs. APS.

Radio Telegraphy. Address before the Institute of Radio Engineers. The development of radio telegraphy is described briefly. The work done by the Marconi Co. in England with the triode valve is described. (To be continued.) G. MARCONI, *Telegraph and Telephone Age,* 8-1-22. IG.

Making Radio Apparatus. Some of the methods used in making the various small metal parts in the winding of coils

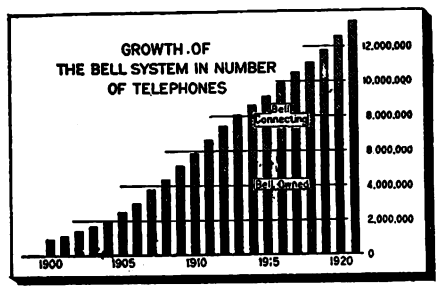
and assembling of complete apparatus are described. These include bending various wire connections, punching variometer spiders, winding basket-ball variometers, soldering and assembling variometer connections, assembling transformer cores, and others. FRED H. COLVIN, *American Machinist*, 6-22-22, 2450 w. MAH.

"Wherefore" of Vacuum Tubes. The various properties and characteristics of vacuum tubes are described. It is explained how the vacuum tube provides a destination for electrons. The use of the vacuum tube as detector and amplifier in radio receiving sets. H. R. FRITZ, *Telephony*, 8-5-22, 5000 w. IG.

Minerals Suitable for Detectors in Radio Instruments. Galena crystal in contact with point of fine copper or brass wire. Carborundum in contact with fine steel or copper point. Lenzite in contact with fine steel or copper point. Zincite in contact with chalcopyrite or bornite or copper pyrites. Iron pyrites in contact with gold point. Molybdenite in contact with brass or silver. Silicon in contact with gold or brass. Cerussite (trade designation) in contact with copper or brass point. With practically all of the metals listed above the metal point in contact with the crystal can be iron, steel, copper, brass, silver or gold. The metals listed are those that have been recommended by various investigators. *Eng. Mining J.-Press*, 8-12-22, 500 w. CJW.

Telephones in Mines. Sixteen States have rules relating to telephones in mines. Various phases of these rules are discussed. Requires more rugged construction than that for ordinary installation. Generally accepted types are housed in moisture and rust-proof iron or steel case of sufficient thickness to prevent injury. Waterproof windings and special insulation are used throughout instrument. Under average service two standard dry cells will furnish talking current for a year or more. Various methods of arranging circuit are described and illustrated. D. E. A. CHARLTON, *Eng. Min. J.-Press*, 8-26-22, 2000 w. CJW.

Electrical and Magnetic Weld Testing. Study of application to butt welded steel plates. Comparison made with physical tests. Commercial possibilities of magnetic method of testing discussed. Test consisted in measuring electrical or magnetic potential drop across weld with definite EMF or magnetic potential applied on opposite sides of weld. Detailed description of apparatus is given, as well as curve sheets of results obtained in measurement. Shown that tests will pick out faults in welds irrespective of type. Magnetic appeared to be more accurate and reliable of two methods. Easy to tell from results of magnetic test whether weld is good, fair or poor. Tension tests indicate much poorer quality of welds than magnetic or electrical. Tension tests claimed to indicate much poorer quality than actually exists. Magnetic or electrical tests show more clearly the average quality of weld. T. SPOONER and L. F. KINNARD, *Iron Age*, 7-20-22. 4,000 w. IG.



(Magazine of Wall Street)

Carbon Electrode Industry. Discussion of grinding, mixing, molding and extrusion. Pulverizing is done to obtain desired grading by grinding of all material in mill arranged to give specific grading or to obtain desired grading by screening. Practice as to grinding pitch differs in various plants according to mixing requirements. May be coarse or fine ground. Proportioning of materials is usually done by weight or volume. Improvement has following automatic weighing machines. Mixes with pitch as binder are not stored any length of time because of segregation. Mixing machines are steam heated. Object desired in mixing carbon is to use as little binder as possible and still have pieces hold together after extrusion from die. Extruded electrodes are usually for electrolytic work. Molding process usually results in higher dencity electrode. Extrusion more rapid. Typical installation for extrusion illustrated. Twenty-four factors affecting production of green electrodes in extrusion process are listed. Rejects may be due to splits, core carbons, end splits, distorted in shape, excess of pitch, die rings, enlarged ends, oval ends, blistered skins or cross checks. CHARLES L. MANTELL, *Chem. Met. Eng.*, 8-9-22, 4000 w. CJW.

Two series of studies have been undertaken at Pittsburgh, Pa., by the Bureau of Mines in connection with electrical shot firing methods in mines. The first problem is the relative danger of firing shots with iron and copper "leg" electric detonators, which has a possible bearing on the mine fires reported in the Utah field. The second problem is the cause of misfires in the firing of a large number of series shots by push-down type blasting machines in places where the leakage current through the earth is excessive.—*Bureau of Mines Bull.*

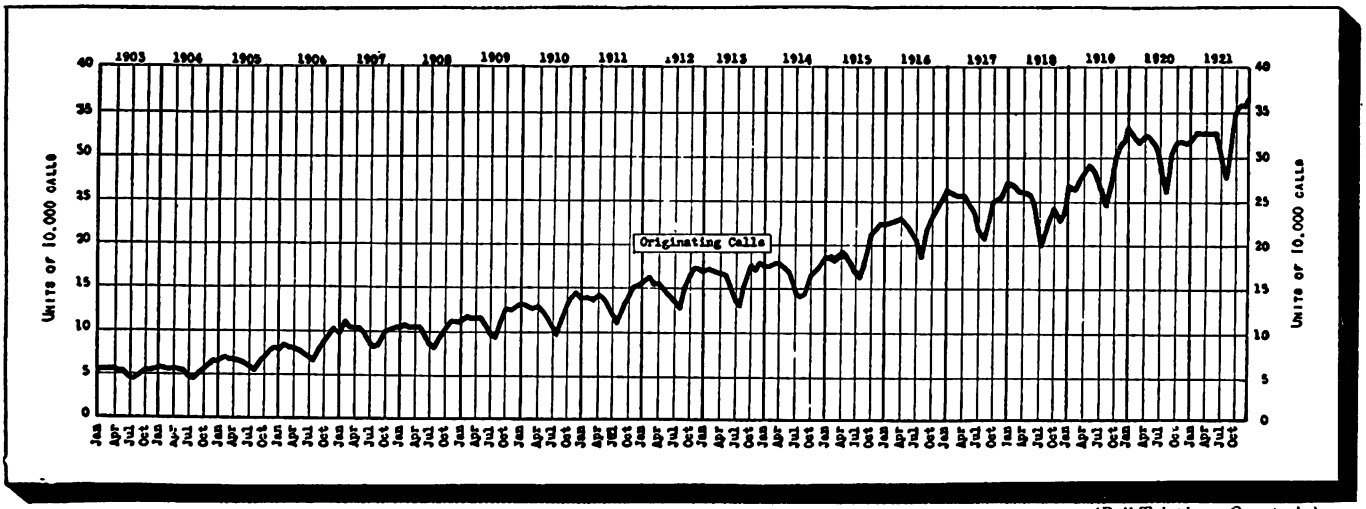
Fiber. Fiber sheets are made by passing paper through chemical bath. As it rewinds over large drums chemicals cause laminated sheets to unite in homogeneous mass. Tubes are made in same way, using small mandrels. Fiber in its finished form has a perfectly smooth and even surface that readily takes a high polish, a finish equal in many respects to that of hard wood. It has a toughness three times that of leather. Used in lighting and starting ignition, motors, dynamos, armatures, telephones, plugs and sockets, switches, and in many parts of electrical equipment. It is an excellent insulator. Other uses are given. C. H. THOMAS, *Raw Materials*, 8-22, 750 w. CJW.

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(Bell Telephone Quarterly)

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The Penalty for High Coal Prices

THAT the anticipated shortage of hard coal is likely to result in the use of substitute fuels is indicated by reports from various sections of the country. Extensive preparations are being made by gas companies to meet the increased demand for gas by domestic consumers. A more active call for gasoline is reported in many sections, especially where the railway strike and shortage of cars are necessitating the use of motor trucks to a greater extent than heretofore. Manufacturers of kerosene cooking stoves, water heaters and room heaters are reported to be working day and night to meet the threatened shortage of their products, which is due to the rapidly growing demand for kerosene for domestic purposes. According to the *New York Commercial,* there is noticeable increase in demand from manufacturers and other consumers for fuel oil. The larger oil companies are receiving many inquiries from manufacturing concerns regarding conversion of coal-burning boilers into oil burners. The size of the fuel and power market is shown in the chart below.

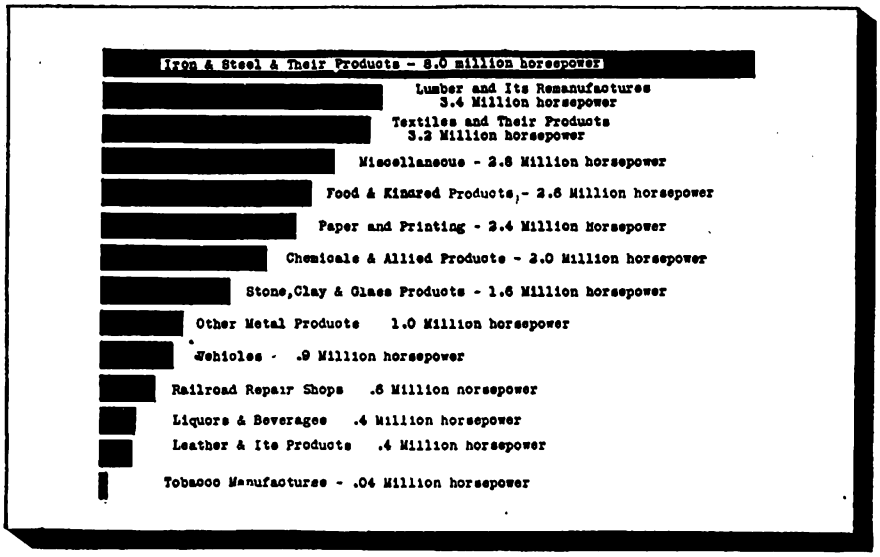
The Iron Trade Review points out that the increasing frequency with which industry is threatened or seriously affected by failure of the coal supply has literally driven hundreds of manufacturers to the use of petroleum. In many cases, ocean steamships have begun using oil exclusively. The cement manufacturers, constituting the fourth largest users of coal, last year consumed 2,300,000 bbls. of crude oil and over 3,000,000,000 cu. ft. of natural gas.

Building Supply News points out that with prices of hard coal going skyward, consumers are beginning to drop out of the market. Realizing that their urgent demand for immediate delivery of available coal, regardless of price, is to a large extent responsible for present prices, industrial plants are endeavoring to reduce prices by refusing to listen to unreasonable quotations. It is believed that if industry is to be subjected to periodic failures of the coal supply, eventually it will turn to a source of fuel which is more dependable. This action will be hastened, if, as seems probable in the present case, each period of idleness is followed by a mad scramble on the part of operators to recoup their losses by charging exhorbitant prices. Although coal is considered indispensable, it is pointed out that manufacturers might surprise themselves, as well as the operators, by demonstrating the extent to which oil and gas might be substituted.

Fuel Economy. Fuel economy of old plant may be better than its anxious friends realize. Test of Government plant, consisting of 2 Babcock and Wilcox boilers fired by means of overfeed stokers and equipped with fuel economizer in uptake, showed that boiler and stoker efficiency was 75% and overall efficiency of boiler, stoker and economizer was 78%. Plant was found to be 3 to 5% more efficient than new equipment contemplated. Methods of testing and results given. A. R. MUMFORD, Bureau of Mines, Reports of Investigations, No. 2373, 4 pp. (1922). CJW.

Liquid Fuels. General specifications are: free from acid and alkali, grit or other foreign substance, likely to prevent flow of oil; sufficiently high flash to insure safe storage; low moisture content. Proper combustion of these fuels always a problem. Methods for testing flash point, water and sediment as well as sulphur and viscosity. Colloidal fuels contain more heat units per gallon than ordinary fuel oil and are heavier than water. Ash content relatively low. *Petroleum Age,* 7-15-22, 2500 w. CJW.

Combustibility of Blast Furnace Fuels. Influence of structure on the combustibility and other properties of solid fuels used in steel works. Influence of dimensions of particles, homogeneity of size and structure of natural fuels. Influence of parent substance, conditions of carbonization, temperature of carbonization, period of carbonization, preliminary treatment and structure on combustibility of carbonized fuels. The combustibility of coke as a factor in reducing fuel consumption in the blast furnace. Important article, illustrated with 15 figures of fuel structure. Many references to original sources of data and very thorough discussion. E. R. SUTCLIFFE and EDGAR C. EVANS, *Blast Furnace & Steel Plant,* 8-22, 10,000 w. APS.



Showing the primary horsepower consumed by the major manufacturing groups.— *(A. B. P. News.)*

Fuel Gases in Iron and Steel Plants. Gives characteristics such as theoretical combustion temperatures, analyses, percentage of heat available with perfect combustion, etc., of blast furnace, coke oven and producer gas. Methods of production and utilization. Use in continuous heating furnaces. Diagrams showing roof temperatures required to give equal heat transfer in continuous billet heating furnaces and furnace capacities corresponding with various rear roof temperatures. H. S. WATTS, *Iron Age,* 7-20-22, 4000 w. APS.

Mixing Natural and Oil-Water Gas. In order to make possible satisfactory all-year service, found necessary to modify standard for gas quality and present standard of 750 B.t.u. per cu. ft. was established. This has resulted in making it possible to maintain gas of practically uniform quality. Results fully justify slightly higher cost on heat unit basis. Discussion of natural gas requirements for domestic purposes. HARRY L. MASSER, *Gas Age Record,* 8-12-22, 2000 w. CJW.

Oil Burning, Using Cold Air. Proper method of burning oil is with air at pressure of 12 oz. to 2 lbs., or with compressed air with 15-lb. pressure. May also be applied to burning of pulverized fuels. No attempt has been made to touch conditions existing in regenerative or recuperative furnaces or steam boilers. With pressures less than 12 oz., the

cost is much greater. *Iron Age,* 8-3-22, 750 w. CJW.

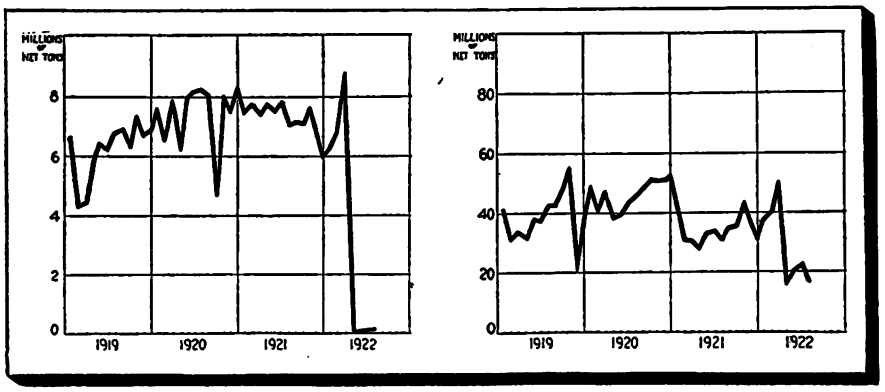
Stratification of Gas Mixtures. Known for some time that large masses of unstirred gas mixtures rapidly change in composition; same is true in compressed gas cylinders. Well-defined opinion that this is due to gravitational effect upon gases of greater density. Lack of uniformity in temperature will cause convection currents to be set up in both the gas and water. An equilibrium is reached between the soluble portions dissolved and undissolved, whereby the greater percentage of the soluble is in the droplet than in the gas body. There is probably no remedy for the unmixing of gases in gasometers as long as gas enrichment materials are easily condensed and are so freely soluble in water. Agitation would probably reduce the effect, but cost would be out of proportion to advantage gained. P. E. HAYNES, *Gas Age Record,* 8-1-22, 800 w. CJW.

Purchased Power. Impossible to make general classification of mines which should or should not purchase power because so many variables enter into problem. Fully electrified mines will have power requirement under average mining conditions when working 180-200 days per year of 2.75 to 3.5 kw.-hr. per ton. Most of mines in Middle Western coal fields have extremely inefficient plants and power costs is as high as 25 cents per ton. Similar mines using purchased power have total cost of 7 to 14 cents per ton of output. Thus, if power is to be generated at mine, plant must be designed with view to economy. When operating economically and arranged to furnish power for two to more mine operations, cost of power can be brought well below that paid for purchased power. Power costs not only consideration. Continuity of service, uniform characteristics of power, etc., are equally important. Hauling water for plant negatives power economy. In general, if cost of purchased power exceeds calculated generated power cost by 10% it would still be advisable to purchase power. W. C. ADAMS, *Coal Age,* 7-27-22, 2500 w. CJW.

Power from Refuse. Power available from gasification of one ton of dry wood refuse is 750 hp. Average calorific value of one cu. ft. of vegetable gas is 130-135 B.t.u. This gas may be used in internal combustion engines of most types and for heating purposes. Chief objections are its bulk and high ash and moisture content and production of tars. Mechanical problems involve construction of furnace and hopper to admit fuel being fed sufficiently fast to keep the fuel at required level in producer and effective cleaning of gas from all traces of tarry matter. These are accomplished in Wells producer. Gas contains 23% carbon monoxide and 13% hydrogen. C. S. H. TUPHOLME, *Power Plant Engineering,* 9-1-22, 1200 w. CJW.

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Anthracite Coal Production—Output since April 1, 1922, consists entirely of fine sizes, dredged from rivers.

Bituminous Coal Production—Effects of strikes are shown clearly.—*(Federal Reserve Bank, Philadelphia.)*

Heat Losses from Pipes. High-temperature superheated steam running up to 800° F. and high-temperature chemical processes are being more and more widely used. Question of heat losses from pipes under such conditions of importance to engineering profession. Losses from wrought iron pipe have been measured for temperatures up to and including 800° F., and are shown in tabular form. Empirical formulas are presented whereby loss from insulated pipes of any diameter may be readily calculated. R. H. HEILMAN, *Mechanical Eng., 7-22,* 1500 w. 3 curves. CJW.

Refrigerating Plant Economy. Basic requirements of efficient plan are lowest possible condenser pressure and highest possible back pressure; highest possible CO_2 and lowest possible flue gas temperature, prime mover in good condition and minimum number and power of auxiliaries of economical type. Importance best expressed in following table:

Every 10 lb. reduction in condenser pressure reduces ammonia compressor power.	5.0%
Every single pound increase in suction pressure reduces ammonia compressor power	2.5%
Every 5 degrees reduction in ammonia liquid temperature represents	1.0%
Every 5 degrees reduction in distilled water temperature represents	2.5%
Every 25 degrees reduction in flue-gas temperature at 13% CO_2 represents	1.0%
Every 1% increase in CO_2 between 11% and 14% represents	1.0%
Every 1% increase in CO_2 between 9% and 11% represents	2.0%
Every 1% increase in CO_2 between 7% and 9% represents	3.0%
Every 10 degrees increase in feed-water temperature represents	1.0%
Every pound rduction of back pressure on the steam engine represents about	1.7%
Every 1-inch gain of vacuum at the steam engine up to 25" represents about	1.0%
Every sq. ft. of uncovered steam pipe causes a loss of ½ ton of 11,000 B.t.u. coal per year.	

Discussion of standards of performence for various parts of plant. VICTOR J. AZBE, *Ice Cream Trade J., 7-22,* 1500 w. CJW.

Outline of Absorption Refrigerating System. Complete absorption system is outlined, with cycle of operation. Then the functions of each of the parts is discussed. Among the parts mentioned are generator, analyzer, rectifier, condenser, receiver, strong ammonia receiver, brine cooler, absorbed, ammonia pump, heat exchanger, weak liquor cooler, etc. D. L. FAGNAN, *Power,* 6-30-22, 2750 w. MAH.

Overcoming Heavy Costs of Belt Maintenance. There is still so much machinery driven by belting that cost of this in average factory is a considerable item. It is also one that requires much skilled knowledge, untiring care and patience to cut down. Author tells all about belts and belting primarily along lines of efficiency which will permit a reduction of maintenance costs. He gives details of proper supervision of belting and the need for regular inspection by qualified men, tells about proper tension, correct alignment of shafts and pulleys, correct crowning of pulleys, the preparation of the belt for lacing, making a laced joint, effect of great tension, etc. J. H. RODGERS, *Canadian Machinery,* 6-15-22, 3200 w. MAH.

Oil Film on Cylinder Walls. Viscosity, surface tension and volatility of oil influences oil film which forms on cylinder walls. Under certain conditions high viscosity oil might fail to form at all, because they are not atomized as readily. Temperature lowers viscosity and with superheated steam, necessary to raise initial viscosity of oil. Mechanical conditions of cylinder, piston and rings must also be considered. Always good plan to increase oil feed just before shutting down, so that there will be every opportunity for thick oil film to form for protective purposes until engine is to operate again. W. F. OSBORNE, *Power,* 8-22-22, 750 w. CJW.

Manufacture of Ice. Development of industry from distilled water plants of early days in industry to present. Tables showing relation of condenser pressure on power consumption per ton of ice, to temperature of condensing water, variation of suction pressure and power consumption, relation of brine strength to freezing point of same. Advantages and disadvantages of various types of apparatus are discussed. Good cake obtained by sucking out about one gallon of water from center of cake just before ice is completely frozen and refilling with clear water. HARRY T. WHYTE, *National Engineer, 7-22,* 2000 w. CJW.

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Steel Four Dollars a Ton Higher

ACCORDING to *The New York Commercial,* "the wage advance at blast furnaces, steel mills, and the Connellsville coal mines will probably increase the cost of making the average ton of finished steel $4 or more, while aside from these definite advances, additional costs in operating as a result of curtailed operations will have to be considered by the industry for a number of months to come." During the past week, it is reported, semi-finished mills were obliged to operate on much lower schedules, while sheet, bar and blooming mills were running on half time and less. The supplies of material for fabricating plants using steel are rapidly becoming exhausted and it is expected their operation will soon be affected. An increasing call for steel products has been felt since last January, as shown in the chart on this page.

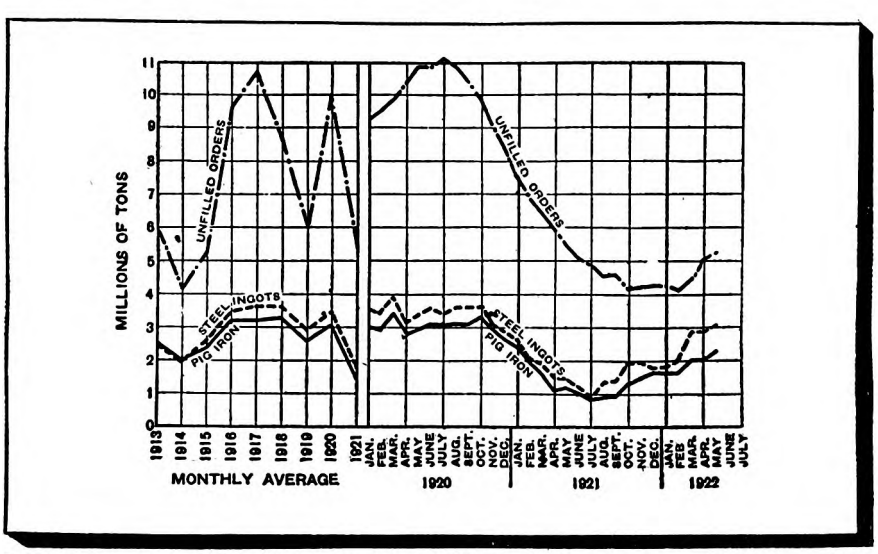
The *Iron Trade Review* is of the opinion that even under the best conditions operations cannot be restored to a satisfactory rate before the end of 1922. And *Iron Age* points out that a flood of price advances, covering nearly the whole range of iron and steel products from pig iron to nuts and bolts, has followed the wage advances at the steel works and at non-union mines. Little steel has been booked at these higher prices, as few producers can promise deliveries. The elimination of the fourth and fifth classes in the priority scheme of the Interstate Commerce Commission, leaving steel in the third but still in the last class, is not regarded as improving conditions to any appreciable degree.

Another important factor is that the wage advances by non-union mines in the Connelsville region has not resulted in a return of all of the workers and it is reported that production in this important coke center is still restricted. It is also not yet certain how far the 20% advance in the steel works wages will relieve the shortage in common labor. And this factor, it is pointed out, is more important in estimating the supply for the remainder of the year than is commonly appreciated.

Manufacture and Properties of Wrought Iron. Two processes. 1. Direct reduction from ore. 2. Refining of pig iron, which is by far the more important, although the former was first used and was the only method known for many centuries. Description of the puddling furnace used. Details of operations. Chemistry of the refining process. Mechanical puddling has not succeeded and hand puddling continues to be the rule. Specifications for the wrought iron and its physical properites. This article is excellent for general information. JAMES P. BALDWIN, *Amer. Soc. Steel Treating,* 8-22, 3500 w. APS.

Merchant Bar Iron. Merchant bar iron is wrought iron made from reworked iron scrap or a reworked mixture of iron and steel scrap. Manufacture is described in hand busheling and in mechanical busheling furnaces. Test results are given showing physical properties and chemical analyses of the material. It stands in a measure between the refined puddled wrought iron and mild steel and is useful for many purposes. It results in the economical use of a large tonnage of scrap iron and steel which otherwise would have to go through the open hearth-furnace, and the scrap which is least desirable for the open hearth-furnace is most desirable for the busheling furnace. M. W. MYERS, *Raw Materials,* 8-22, 1200 w. CJW.

Malleable Cast Iron. Non-technical article by the consulting engineer of the American Malleable Castings Assn. Pure iron castings are commercially inferior. Malleable cast iron, made by melting together a certain proportion of pig iron, sprew and low-carbon scrap of the proper composition, yielding a product that is sound, strong and easily machinable. ENRIQUE TOUCEDA, *Amer. Machinist,* 8-31-22, 4500 w. APS.



Production of pig iron and steel ingots, and United States Steel Corporation's unfilled orders, monthly average since 1913.— *(U. S. Bureau of Census.)*

Canada's Iron Ore Problem. No known deposits of merchantable iron ore sufficiently attractive to induce its development. Large bodies of low grade magnesite and siderite ores, which can be beneficiated to merchantable grade by magnestic separation or calcining, but these have not been developed commercially. No immediate prospect that cost of electric power will be low enough to admit of electric smelting. Blast furnace only practicable smelting agency for some time to come. Difficult to convince government that new system of iron bounties is necessary. Only logical measure of assistance to be expected of government at present time is more extensive geological exploration. G. C. MACKENZIE, *Canadian Mining J.,* 7-28-22, 3000 w. CJW.

Steel Scrap in Cupola Iron Mixtures. Steel scrap improves or injures cast iron ("semi-steel"), depending on how much is added and how it is added. Diagram of effect of per cent steel scrap in mixture on strength of castings shows a maximum for high and low silicon iron at 40% steel. So large an addition is not desirable, as this mixture becomes sluggish on daily remelting. Twenty to 30% steel scrap is a good figure. E. J. LOWRY, *Iron Age,* 8-10-22, 1800 w. APS.

What Is Steel? The nature of "steel" has been changing as new processes have produced new products. Some have considered the capacity for hardening in water as a distinguishing characteristic of steel, but the essential characteristics are not this, but two others: 1. The manufacture by melting. 2. The quality of malleability. Carbon content may be included in the definition and will then be given as 0.10 to 2.25%. Discussion of the nature of steel, the allotropy of iron, the various forms in which carbon and iron exist in combination and the effects of impurities. Research in the steel industry. A discursive and historical article. J. A. MATHEWS, *Amer. Soc. Steel Treating,* 8-22, 7000 w. APS.

Thermal Expansion of Steel. Data on the anomalous expansion of a few steels and irons have been recorded and made available for reference. The expansion of iron from 25 to 100° C. was found to be $12x10^{-6}$, while the average expansion of number of steels over this same range was found to be $11.2x10^{-6}$, and for a range of 225 to 600° C., $14.2x10^{-6}$. The coefficient for ordinary steels which have been heated above the critical regions have been evaluated as approximately $23x10^{-6}$. An attempt is made to throw some light on the magnitude of the tendency towards warping or surface cracking as related to rate of cooling and width of critical regions. W. SOUDER and P. HIDNERT, Bureau of Standards, Scientific Paper, No. 433. 15 pp. 5 cents. CJW.

Acid Pickling and Brittleness in Steel. Disputes the contention that embrittling action of pickling is due to eating out of grain boundaries in steel, and supports the suggestion that pickling forms minute grooves or notches on the surface which cause the metal to begin to tear at the grain boundaries. Another explanation deserving consideration is the absorption of hydrogen as causing brittleness. Facts for and against these theories. *Canadian Machinery*, 8-17-22, 1000 w. APS.

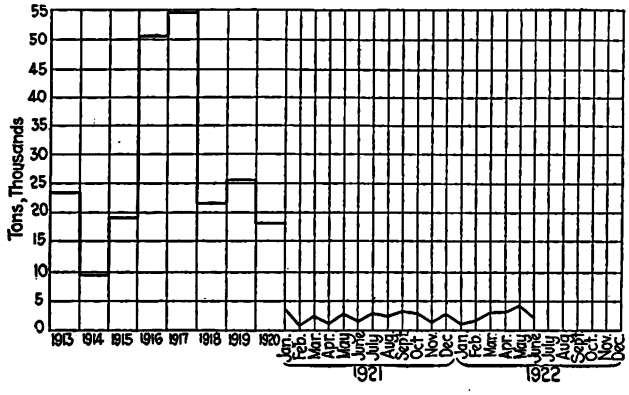
Nickel Chromium Steels. Discussion of the making, forging and heat treating of these steels. The billets are prone to surface defects to greater extent than ordinary steel billets. Nickel-chrome billets which are going to be severely handled are finally rolled from rough-turned blooms. Suggestive conclusions are drawn between nickel steels and nickel-chrome steels. When properties of the two steels in oil-hardened and tempered condition are plotted together there is very little to choose between them. Use of nickel-chrome steel is justified when oil-hardening is used for massive parts, or objects requiring to be air-hardened have to be dealt with. Most important measurable properties of sound steel are its tensile strength and its notched bar impact figures. Developments in the manufacture of alloy steels have been of a rather haphazard nature. HARRY BREARLEY, *Forging-Heat Treating*, 8-22, 3500 w. CJW.

Trend in Rolling Mill Drives. Extensive plants, representing the modern tendency in steel plant construction, have slowly outgrown the steam engine, as this author points. He shows how the modern plan is to use the more efficient steam turbine in connection with the electric generator for power generation, and then use this by means of electric motors in the various pieces of equipment of the plant, with a resultant greater overall efficiency than was considered possible years ago. He shows, moreover, that the modern plant is run continuously, the former reversing mill having been generally abandoned in favor of working all in one direction. He points out, however, that the general use of central station power is still far away and gives reasons why this is so. GORDON FOX, *Blast Furnace & Steel Plant*, 7-22, 3200 w. MAH.

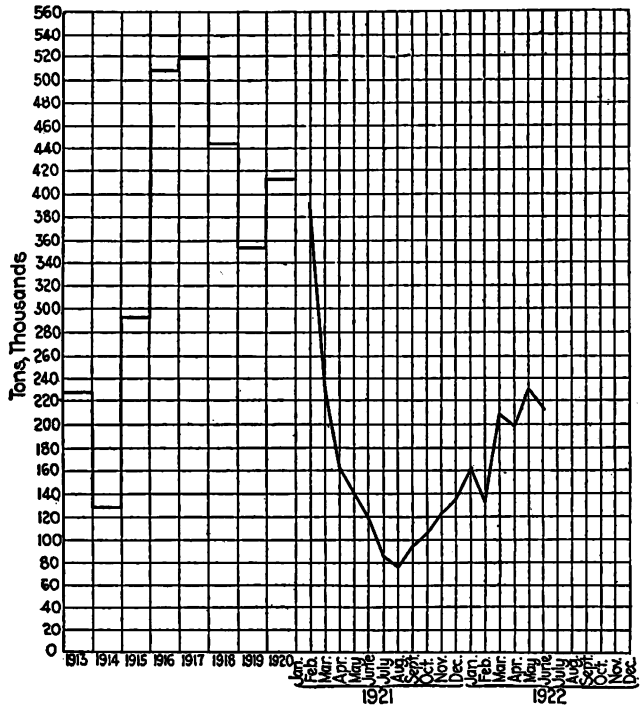
Material for Forgings. Selection of steels to suit the purpose. Importance of accurate specifications and exhaustive tests. The importance of heat treatment and laboratory supervision. Popular article with photographs of testing machinery, laboratory, etc. *Amer. Machinist*, 8-10-22, 2500 w. APS.

Annealing of Tool Steel. An endeavor to show, by illustration and explanation, the whys and wherefores of the annealing of tool steel. Tool steel performance is dependent upon great number of details, but provided due care has been used in previous manufacturing operations, it is believed that the annealing process stands out as the dominating factor. The factors which determine the annealing operation are time, temperature, mass, surface, and human element. Special attention is directed to the inseparable relationships existing between these factors. A. W. F. GREEN, *Forging-Heat Treatment*, 8-22, 2500 w. CJW.

Distortion Produced in Casehardening. Author found that small holes in a hardened part were made with difficulty because of need for final exactness and variation in hardening. Hence, investigated these variables and influence of each on results: Grade of steel used, size of opening compared with diameter of piece that is wall thickness, and nature of opening (square, round, hex, etc.). Small, round discs were used in the experiments, with a series of different sized and shaped holes. All the holes were miked, then the pieces were caschardened, and the holes measured again. Then they were reheated in lead and quenched in oil, cleaned and measured a third time. Finally they were heated again, water quenched and measured accurately. The data given include the figures for all these experiments. Author claims that the outstanding point was that minimum warpage was found in manganese steel, this being not alone small but markedly and consistently so. A. A. BLUE, *American Machinist*, 6-22-22, 1700 w. MAH.



(Above) Monthly exports of pig iron from United States. The horizontal lines at left show average month for each year. The curve at right shows the movement during 1921 and 1922.



(Right) Monthly exports of all iron and steel from United States. The horizontal lines at left show, in each case, the average month of the year indicated. The curve at right shows the movement during the past 18 months.—(*Iron Age*)

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LEATHER

Leather Prices Advancing

ACCORDING to *Shoe and Leather Facts,* all indications point toward higher prices for leather. A writer in this publication points out that the reasons for higher prices for all kinds of leather are: (1) that all surplus shoes have been put into consumption; (2) the surplus of upper leather in the hands of tanners has been cut over one-third; (3) hides have been consumed as fast as they have been tanned during the past two years; (4) shoe manufacturers are not carrying any leather.

American Shoemaking points out that, while the passing of the high-duty menace may have had some influence in price inflation, other factors have been of greater importance. The prospect of abundant crops promise an increased buying power.

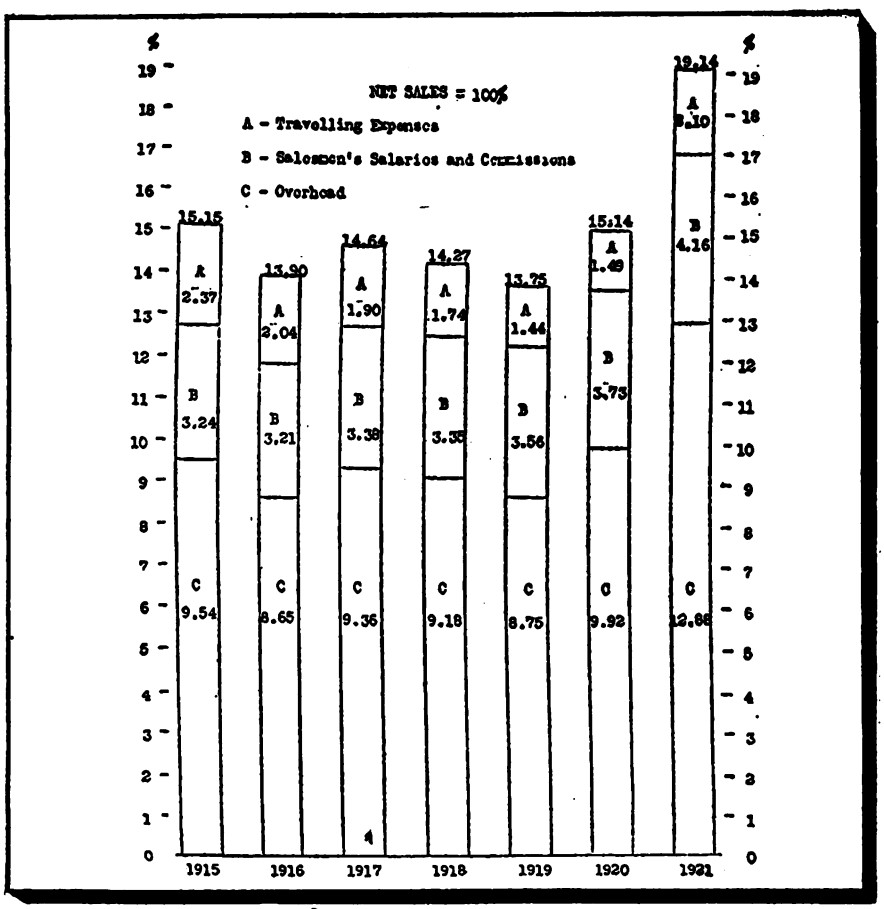
However, *Boot and Shoe Recorder* states that the outlook for a resumption of fall buying of shoes on a larger scale is excellent and quotes a leading shoe manufacturer as predicting that a shortage of high-grade shoes is likely to take place before the end of the season. The fact that four weeks delivery is requested on new orders coming into the factory is believed to indicate that retail merchants, particularly the department stores, are short of good shoes. In view of the talk of higher leather prices, the accompanying chart analysis of the cost of shoe wholesaling is of interest at this time.

The Leather Manufacturer reports that, with the markets on raw materials and especially on hides taking on all the characteristics of a boom, tanners are confronted with the alternative of either securing still higher prices for finished leather or taking a loss.

Leather Industry. Historical review, in which mention of leather in the Bible is discussed. Use of tanned skins for writing purposes seems to have been known to all ancient peoples. Primitive methods of tanning described. *Shoe Repair Service,* 8-22, 1600 w. CJW.

Leather Belting Specifications. Results of work of joint committee of Leather Belting Exchange and Bureau of Standards. Discusses method of manufacture, laps, thickness, technical tests for strength, stretch, water absorption, and chemical analysis. LOUIS W. ARNY, *Mill Supplies,* 2000 w. CJW.

Sole Leather and Sulfite Waste Liquor. Leather filled either partially or entirely with sulfite cellulose extract is as durable as leather filled with ordinary tanning materials. Chemical analysis indicates that this extract is equally as firmly fixed in leather as vegetable tanning materials. Use of such a material instead of chestnut and quebracho would conserve these materials for use in actual tanning processes for which they are suitable, and for which sulfite cellulose extracts have not been successfully used. It is probable that this material could be used as a filler in place of the more soluble glucose, thereby producing a more waterproof leather. Leather filled with this material can be made which will have as light as uniform a color as leather filled with ordinary materials. Using this material as filler has no more effect on aging of leather than ordinary materials. ROY C. BOWKER, Bureau of Standards, Technical Papers No. 215 (1922), 5 pp. 5 cents. CJW.



Cost of shoe wholesaling in 1921. The chart shows the decided advance in the costs of doing business for 46 shoe wholesalers in 1921. The chart is based on net sales equaling 100%. Costs vary from 13.75% to 19.14% within two years. Although the cost of living was down in 1921, the percentage paid for traveling expenses was considerably increased. The figures were collected by the Western Association of Shoe Manufacturers and Wholesalers.—*(Shoe Retailer.)*

Important Points in Joining Ends of Belting. Usual shop practice is to unite ends of belting with lace leather. The difficulties with this are listed and commented upon by the author. The holes reduce the strength of the belt, a poorly made joint does not run smoothly nor quietly. Hints are given for the shop mechanic who joins the belts. LOUIS W. ARNY, *Can. Machinery,* 7-6-22, 2000 w. MAH.

Cutting Upper Leather. Manufacturers often indifferent to methods tending to make department of upper leather cutting most efficient in factory. Scientific method of tabulation should be employed. Since a machine and a method can be made to work in harmony on white canvas used in making shoes, it is certain same machine and method can be used to much better advantage on upper leather, due to fact no two skins are alike. Adding to this a service by trained men, practical cutters, whose duty it is to aid in every manner possible upper leather cutting department staff, to train men how to obtain and retain standard of cutting shoes, tabulate losses and gains in footage and money as well as each man's ability at board, additional strength is secured. *American Shoemaking,* 8-22, 800 w. HHH.



Shortage of Mine Labor Acute

ACCORDING to *Engineering and Mining Journal,* the difficulty of obtaining an adequate number of competent miners is the outstanding feature of the situation in the mining industry today. While grave anxiety is expressed in some quarters regarding coming weeks and months, it is impossible to find any instance in which current production has been affected appreciably either by a lack of fuel for power plant or smeltering purposes, or by inadequate transportation facilities for moving ore. In the West, hydro-electric and fuel-oil power plants supply a large proportion of the requirements, and in addition coal is obtainable from the non-union fields.

But Western operators are appreciating more than ever the fact that a common laborer does not make a miner. He has not the endurance or the skill of the experienced miner and is consequently more expensive because of increase in number of accidents and added probability of damage to machinery.

The restriction on immigration is believed to be largely responsible for the shortage of workers. Before the war the rate of immigration was a million persons per annum, in 1913 it was 1,197,892 and in 1914 it was 1,218,480. During the war the average inflow of population was 300,000, but the outflow was 150,000, so that the net gain was only half the immigration. In 1913 and 1914 the outflow was 308,190 and 303,338, respectively. Last year we received 355,000 immigrants. It is believed that the mining industry is suffering today in loss of efficiency, because a lower type of alien is displacing the better type of alien and the native-born workers that were formerly employed in the mines.

Leaching Ore with Sulfur Dioxide. Low-grade oxidized and sulfide copper ore may be worked up by the use of sulfur dioxide in cases where the soluble matter is too high for sulfuric acid leaching. Plant consists of five departments: crushing, fine-ore treatment, coarse-ore treatment, roasting and precipitating. Vats for fine ore are 16 ft. in diameter and 22 ft. high. Distributor inside gas tight top. Closely spaced slats about 12 ft. deep below this. Dry ore mixed with required amount of water and sulfur dioxide forced counter-current to the pulp. Coarse ore vats larger (40 ft. in diameter). Absorption of sulfur dioxide under proper regulation is complete. Weak or strong gas can be used with equally favorable results. In case of fines, good extraction was obtained in a short time. High repair cost, due to handling acidulous and abrasive pulp. Extraction of coarse ore required from 10 to 30 days. Process is specially adaptable to oxidized ores with high acid soluble content, and also for those that require preliminary roasting. Operating costs are low and it does not require high metallurgical skill. JOSEPH IRVING, *Eng. Min. J.-Press,* 8-26-22, 1800 w. CJW.

Mechanical Sampling of Ore. Discussion of studies and tests made with view to securing accuracy through standardizing operations. Reasonable amount of experimenting must first be done. To guarantee that sampling machine shall actually take quantities intended and make their cuts at uniform intervals throughout the lot, mixing and retarding apparatus must be installed which will deliver continuous stream of feed to each cutter. Room for improvement in many places. Original should be read for details, equations, etc. C. D. DEMOND and A. C. HAFERDAHL, *Eng. Mining J. Press,* 8-12-22, 3500 w CJW.

Shaft Sinking. Description of safe mechanical equipment for shaft sinking, which has always been considered more hazardous than mining operations that are carried on after period of sinking and development. Discusses danger from falling material, need of headframe and guides, defects of simple crosshead, description of safety crosshead, danger of using open hook and description of safety hooks, sinking bucket commonly used and type recommended, platform covering shaft, doors for platforms and responsibility of workmen. Illustrated. R. H. KUDLICH, Bureau of Mines, Technical Paper No. 276, 5 cents (1922). CJV.

Failure of Center Shots in Blasting. In firing shots in wet holes, following recommendations are given: Use waterproof electric detonators with enameled leg wires. Fire the shots from an underground power circuit that has a capacity of at least 30 kw. Use extra care when tamping the holes in order not to damage the insulation of the leg wire. Arrange the connections between the detonators so that they are supported clear of the earth or any other conducting medium. L. C. ILSLEY and A. B. HOOKER, Bureau of Mines, Reports and Investigations No. 2384, 8-22, 10 pp. CJW.

Sampling Dredge Ground. Specific gravity or weight per cubic yard of gravel in place can best be determined by weighing dug samples in bucket against the weight obtained when water is added to fill the bucket to definite mark. Volume of gravel extracted by pumping out at each foot of drive was only about one-third of the volume of such gravel one foot in length and of a diameter equal to the external diameter of the pipe. This was by no means constant from foot to foot, but represents general average. Most dangerous to advise that a correct amount of core should be obtained. Arbitrary value may be erroneous. Fortunately for profession really low percentage recovery of core is generally overlooked and countervailing influence of enrichment likewise, with general result that drill figures are on the right side. R. T. HANCOCK, *Eng. Mining J. Press,* 8-19-22, 1500 w. CJW.

Crushing in Ball Mills. This paper is an attempt to set forth essential differences in theories of Kick and Rittinger, as well as application of each to concrete examples for the calculation of efficiencies. Although the theory of Kick might appear the more logical, experimental work has served to show that Kick's theory is not applicable, while that of Rittinger conforms with the results of experiments. E. A. ROLPH, *Canadian Mining* 8-12-22, 3500 w. CJW.

Steel Props. Classified as temporary supports, semi-permanent supports, and permanent supports. Historical development. Underlying principle is employment of oval or partly oval and partly cylindrical, which can be adjusted longitudinally and be interlocked by partial rotation. On turning the inner tube the flanges which form part of it enter slots in outer tube and so lock. Until one of the tubes is turned they are free to move relative to one another except as opposed by the resistance of the same cushion. Principle of oval interlocking prop may be applied to the corrugated type of Ericsson. JOHN ROBERTS, *Coal Age,* 8-10-22, 1500 w. CJW.

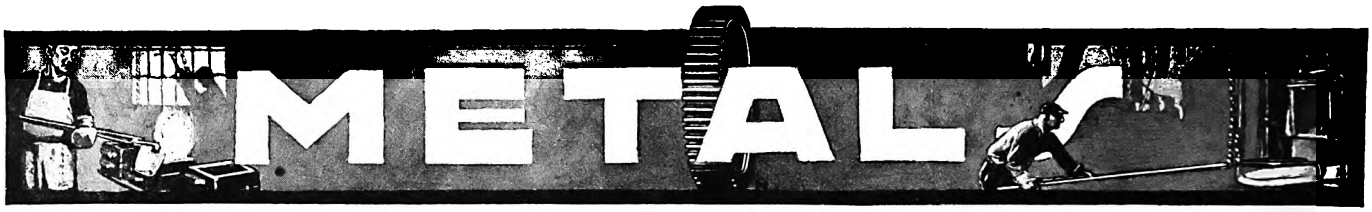
Breakage and Heat Treatment of Rock Drill Steel. Progress report to members of the advisory board to the Bureau of Mines and Bureau of Standards on the breakage and heat treatment of rock drill steels. Practice at various mines has been ascertained by direct investigation. It seems that the nature of the rock and the type of operation determine the breakage of drills. As each mine or type of mine has a different problem to contend with, original article should be consulted for details. *Engineering World,* 7-22, 2000 w. APS.

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Metal Markets Quiet

ALTHOUGH domestic consumers of copper are buying conservatively, the market remains firm. *American Metal Market* says that little effort is being made by producers to force sales. It is pointed out that copper buying always goes in waves. Following several months of sales activity there is always a month or two in which business is very light. One of these between season periods began the latter part of July, but it is believed the buying wave will develop this month or in October. It is hoped that all of the strikes will be settled at that time, and general business will be able to resume on something like a normal basis. If this occurs, another wave of copper buying, both domestic and foreign, of perhaps 200,000,000 lbs. per month, for several months, will take place. The chart on this page shows the turn in the copper cycle in March.

The American Artisan and Hardware Record reports that estimates of August shipments of tin fom the East run up to about 7000 tons, and if this should prove to be the case, and the American deliveries be no better than they were in July, we may expect reaction in prices, which, however, will not be unreasonable. The market has been very much complicated lately by the enormous option dealings, and until these are settled, the outlook will remain uncertain.

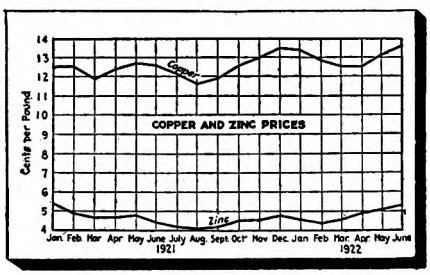
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The general tone of the lead market is reported to be firm and in the New York district supplies for immediate delivery are not plentiful. The strength of the zinc market is thought to be due to the scarcity of offerings, but the ore market is strong with the volume of sales well maintained at ruling prices.

Silver in Movie Laboratory. From 9000 to 10,000 oz. of silver per month recovered from movie laboratory waste. Generally the silver will not average over one-half to one ounce per gallon of spent hypo solution. In one plant iron plates are suspended in these solutions, upon which silver is slowly deposited. In other plants silver is precipitated as the sulfide. In any case, finally melted at about 1800° F., skimmed and then remelted. C. A. Byers, *Eng. Min. J.-Press,* 8-26-22, 800 w. CJW.

Manganese. One of the more common of the metallic minerals. Not found in native form. Principal producing countries are: Russia, India, Brazil, Cuba, South Africa, U. S., Mexico, Japan, and China. Character of ore determines purpose for which it is used. For metallurgical purposes physical characteristics of ore are of much importance. Hard ore in medium-sized lumps is desired in blast furnace practice. For chemical purposes the most important consideration is the amount of available oxygen. Ore is shipped in bulk, by the carload, or from abroad, in larger lots. Considerable care must be taken in sampling ore, particularly in surface work. Grade of ore is determined by wet assay or chemical analysis, based on material dried to 212° F. Market and price of manganese ores in countries of greatest consumption are governed to large extent by the use of steel products. The production of the U. S. is about 1% of its requirements. Cheap labor is the advantage in other countries. Manufacture of ferro-manganese requires cheap power. Statistical data. W. R. Crane, *Eng. Min. J.-Press,* 8-26-22, 3000 w. CJW.

Platinum: Uses, Substitutes and Tests. Properties such as color, hardness, melting point, ductility, malleability. Its chemical resistivity. The numerous uses in the arts and sciences. Substitutes for special uses have been found, although no substitutes are good for all uses. Palau, an alloy of gold and palladium, resists most chemical reagents; rhotanium is a good substitute for electrical heating units. White gold is gold alloyed with one of the group of platinum metals. It resists nitric acid and is used in jewelry. Two alloys used for electrical purposes are nickel, chromium, tungsten and silver, palladium, cobalt respectively. Occurrence of platinum. Tests for purity of platinum. Methods of refining of platinum in the dry and wet ways. *Brass World,* 7-22, 1500 w. APS.



(American Machinist)

Average of New York weekly quotations on electrolytic copper and zinc.

Copper Production for 117 Years in New Mexico. History of the Santa Rita mines from discovery in 1800, working in 1804 to present time. Interesting facts of the past century and the development of the present plant. John M. Sully, *Arizona Mining Journal,* 7-15-22, 5000 w. APS.

Mineral Resources of Cuba. Comparatively little grown. Iron is found as limonite and hematite. Manganese is found as pyrolusite in connection with limestone. Chromite is widely distributed in some provinces. Indications of low-grade copper are found in numerous localities. Indications of petroleum are relatively common occurrence. Cuban asphalt is usually of high grade. Belief that commercial deposits of oil will be discovered is gradually gaining acceptance. E. S. Murias, *Eng. Min. J.-Press,* 7-29-22, 1500 w. CJW.

Welded Pipe Fittings. Welded fittings are less than one half the weight of old style fittings, cost less and are more easily handled. Operating details to produce them. *Welding Eng.,* 5-22, 1000 w. APS.

Dezincification of Brass. First step is dissolving brass as whole. Copper in solution then deposits, replacing brass as a unit. This redeposition will not take place unless there is some means of holding dissolved copper in contact with the brass. This can be accomplished in two ways, one by presence of membrane, other by having large excess of dissolved copper present. Membrane may be anything whatever, so long as it performs function of keeping dissolved copper in contact with brass. Whether dezincification shall take place can be controlled by merely supplying or taking away the membrane. So-called dezincification process can be reproduced in a few weeks in normal hydrochloric acid just as it occurs in nature in several years. R. B. Abrams, *Trans. Am. Electrochem. Soc.,* 8-25-22, 12 pp. CJW.

Brass Forgings. The necessity for extruded blanks for forging is evidenced by the fact that standard brass forgings made properly of inexpensive alloy are 80% stronger than sand castings of a more expensive alloy. The great density and absolute uniformity of such forgings make them very valuable. Numerous diagrams showing metal blank, forging as it leaves die and finished forging. The range of compositions suitable for forging is small. Copper 56 to 63, lead 0 to 3, tin 0 to 3, iron 0 to 3, and zinc the remaining per cent. C. G. Heiby, *Brass World,* 7-22, 2200 w. APS.

Making Two-Part Castings in Three-Part Flasks. Under certain conditions it is necessary to turn out castings in large quantities, and thus, very rapidly which must sustain high pressure. This necessitates a method which is certain to produce sound castings. The author offers the notes in this article as suggestions along this line, rather than a sound, everyday proposition. He takes up a number of different castings of this kind and shows how the arrangement of sprue and runner in the cope, pop gates and upper part of casting in cheek, and lower part in the drag has worked out satisfactorily. W. H. Parry, *Canadian Foundryman,* 6-22, 2000 w. MAH.

Assay of Gold By-products. Methods are given for assaying white precipitate or hydrates (zinc hydroxide mixed with other materials, pan-furnace or borax slag, which may contain as much silver as gold, and old graphite crucibles. JOHN WATSON, *Eng. Min. J.*, Press 7-29-22, 800 w. CJW.

Aluminium Castings. In aluminum alloy foundry parlance metallic and non-metallic inclusions are termed hard spots and in aluminium-alloy sand castings and in die castings they are very troublesome. Inclusions differ so widely that term hard spots is only roughly descriptive at best; in fact, term is exceedingly undesirable and should not be accepted. Hard spots in aluminium alloy sand castings are well known to founders, and certain kinds are frequently found in aluminium-base die castings. Ordinarily come to light during machining. Much difficulty may be experienced when machining these castings, and their presence may be one of principal causes of scrap in addition to ruining milling cutters, lathe tools and drills. Certain kinds of hard spots may be found when gates are being sawed off at band saw or on cutting at sprue cutter or when chipping and grinding is being done. Furthermore, several kinds of hard spots may be readily detected in foundry by fracturing gates; if hard spots are present in gates, they will normally be present in castings. Whether or not hard spots are numerous in a casting, this defect may be such as to cause much difficulty in machining and even prevent finishing of machine work after it has begun. They slow down machining, cause many castings to be scrapped, involve loss of machine work, reduce production, ruin cutting tools and irritate machine operators. Present paper is contribution to literature of aluminium foundry practice and a guide to founders in preventing scrap losses from hard spots in castings. R. J. ANDERSON, Bureau of Mines, Technical Paper No. 290 (1922). CJW.

Aluminum Melting Furnaces. Review of work undertaken by U. S. Bureau of Mines to decrease metal and fuel losses in melting. Preliminary figures showing fuel losses in melting. Preliminary figures showing kinds and magnitude of present losses, types of furnaces used, fuel efficiencies, etc. Important article. ROBERT J. ANDERSON, *Canadian Foundryman*, 7-22, 6000 w. APS.

Electro-Percussive Welding. Most satisfactory classification is under resistance welding. Process limited to joining parts which are not electrically connected before welding. Some advantages claimed are saving of energy, time, welding of unequal sections, of unlike metals, uniformity of product and decrease in finishing time and labor. Classes of machines discussed. Thirty-five examples illustrated. Field of application of condenser type of machine is to small wire products, laboratory products, thermocouples, jewelry, small tools and instruments and vacuum type and lamp parts. The electromagnetic type of machine may be used with automobile parts in large number, tool manufacture and reclamation, hardware and cutlery, turbine blading, rail bonds, switches and electrical detail supplies and tubing joints. D. F. MINER, *J. Am. Welding Soc.*, 7-22, 2500 w CJW.

Electric Arc Welding in Locomotive Work. Illustrated description of a number of different kinds of welds in locomotive work with suggestions as to kind of work which should and should not be done Greatest causes of failures are inefficient and indifferent workmen and little heed taken to have perfectly clean and properly prepared job. Finished results estimated as 90% operator, 10% equipment and materials, while preparation and operation are about 1 50-50 break. C. W. ROBERTS, *J. Am. Welding Soc.*, 7-22, 3500 w. CJW.

Tests for Welds. Various possible methods of inspection available, such as X-ray analysis, acoustical methods, electrical tests, magnetic tests, etc. This paper describes laboratory tests to determine the possibility of applying electrical and magnetic methods for testing the quality of butt welds joining steel plates. Magnetic results seem to give the more consistent results. A fairly poor weld extending over considerable distance will be indicated without the slightest possibility of doubt. T. SPOONER and I. F. KINNARD, *Welding Engineer*, 1800 w. CJW.

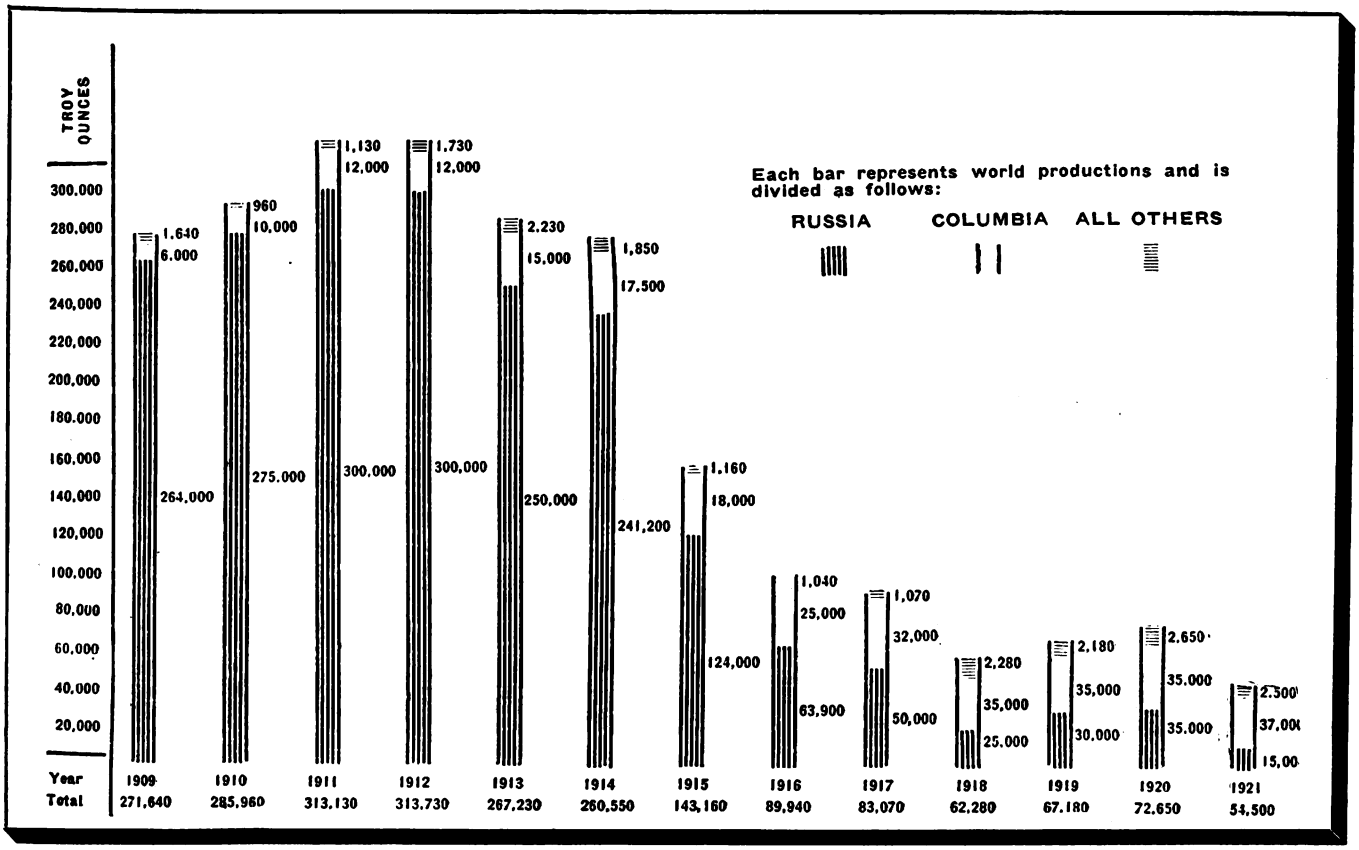
Scientific Side of Welding. Part of a series on this broad subject, this article takes up the use of microphotographs and the benefits derived from a study of them, especially when the microscope is applied to defects in welds. Hammered welds, influence of impure gas, imperfect penetration, annealing, other topics. E. ATKINS, *Welding Engineer*, 6-22, 2100 w. MAH.

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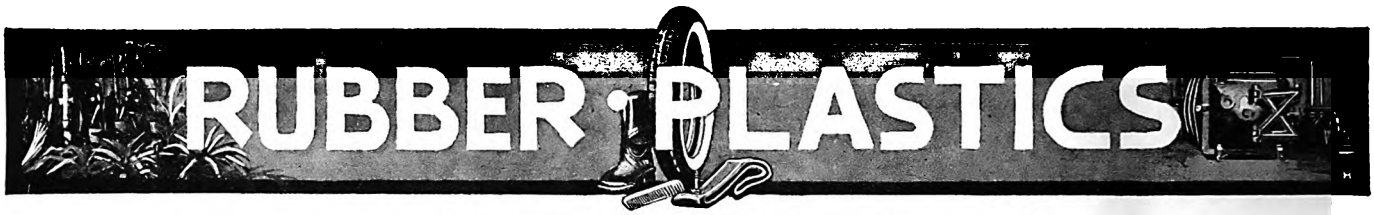
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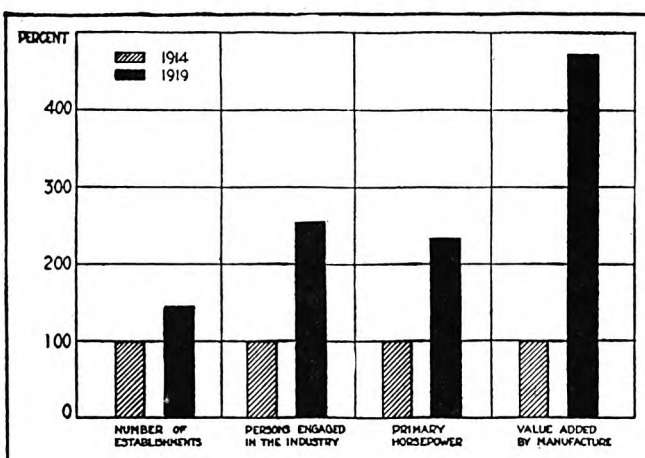
Low Priced Tires Doubtful Expedient

ALTHOUGH automobile tires and tubes are now offered to the user at the lowest prices in their history, it is regarded as doubtful whether cheapness of price will so stimulate the demand for casings and tubes as to bring about the permanent increase in business that is sought. Some manufacturers and dealers believe that it will; others continue to talk quality, and predict a return to higher price levels and what they term "safe and sane" conditions.

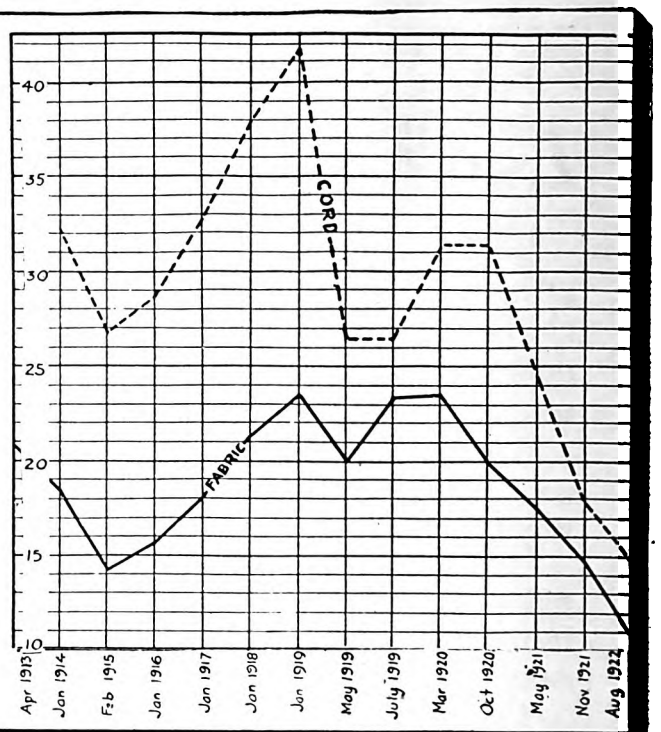
According to some men in the trade, says *India Rubber World,* the manufacturers themselves are responsible for the increasing demand for cheaper tires, because the quality of their tires has been maintained or bettered while prices have been declining. It is pointed out that the price may get so low that there will be no profit left for either maker or dealer.

The accompanying chart shows in a graphic manner the course of consumer prices of both fabric and cord tires from 1913 and 1914, respectively, the latter being the year in which the manufacture of cord tires on a large scale began. The solid line on the chart indicates that the previous "low" for fabric tires was about $14, reached in February, 1915, and the dotted line shows the "low" for cord tires was about $27.

For comparison, it is pointed out that the present average prices of fabric tires are about $10 and of cord tires about $15. This represents the culmination of a steady decline from the peak price in January, 1919, of $23.50 for fabrics and $41.50 for cords.



(Above) The growth of the rubber industry as a whole since 1914 and the pronounced increase in the size of individual plants are noteworthy. (*Federal Reserve Bank, Philadelphia*)



(Right) The course of automobile tire prices from April, 1913, to August, 1922.—(*India Rubber World*)

Factice an Important Factor in Proofing. Crude rubber is mixed with other ingredients for two reasons; first to decrease cost and second to impart certain properties. Factice has been used as a compounding ingredient in the rubber mixture for the past 30 years. Used as 5% to 10% of the rubber batch, it adds durability by taking up and evenly distributing the fillers. Factice is of real importance to the manufacturer of proofed goods by increasing waterproofing properties of rubber mixture. Some higher grade factices, such as those made from rapeseed oil, neutralize the odor of rubber, which is very desirable in the manufacture of rubberized textiles. *Rubber Age,* 7-25-22. IG.

Making Inner Tubes by Tubing Machines. The well-known and customary method of making inner tubes is by rolling. The tubing method is fairly rapid, but rather expensive as to labor cost. More progressive manufacturers are coming to use the method of tubing direct from stock batch. In this manner all calender work, cutting and rolling is avoided and the tubes can be poled for curing directly they are tubed and cooled. A description of machines used is given. Advantages gained are very much increased rapidly in the output of tubes, exactness of size, freedom of tube from air, walls of tubes are of exact thickness. Great saving in labor is also effected. *India Rubber World,* 8-22. IG.

Production Control in Tire Plant. Method of controlling production of tires by series of daily schedules and charts, control boards, etc., is given. W. B. MENDENHALL, *India Rubber World,* 8-22. IG.

Scientific Management for Rubber Factories. Location of rubber factory must be governed by the same principles that govern production in general, namely: nearness to source of raw material, proximity to market, ample transportation facilities, good labor supply, cheap taxation and power. Difficult problem is presented by fact that best conditions are not found at any one spot, due to fact that markets are not located at same points where raw materials are made or imported. Branch factories are offered as solution. High production efficiency will be dependent on care with which equipment is selected and arranged in installation. Model layout of a rubber plant is given. Storage facilities for raw and manufactured products are essential. A. BARUCH, *Rubber Age,* 7-25-22. IG.

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Raw Sugar Prices Advancing

DURING the current month the raw sugar market has shown a slight gain. It is believed that this may be due to the fact that refiners are expected to buy this month, since they did little buying during August, and their needs are not thought to have been taken care of beyond that time.

According to the *New York Commercial,* reports from all sources agree that consumption of sugar in the United States continues to be heavy. The confidence of Cuban holders that the recent depression was only temporary seems to be justified by the statistical position of sugar. Since there is little probability that a large domestic crop will be harvested this year, the United States will continue to be dependent upon Cuba for the bulk of its supplies.

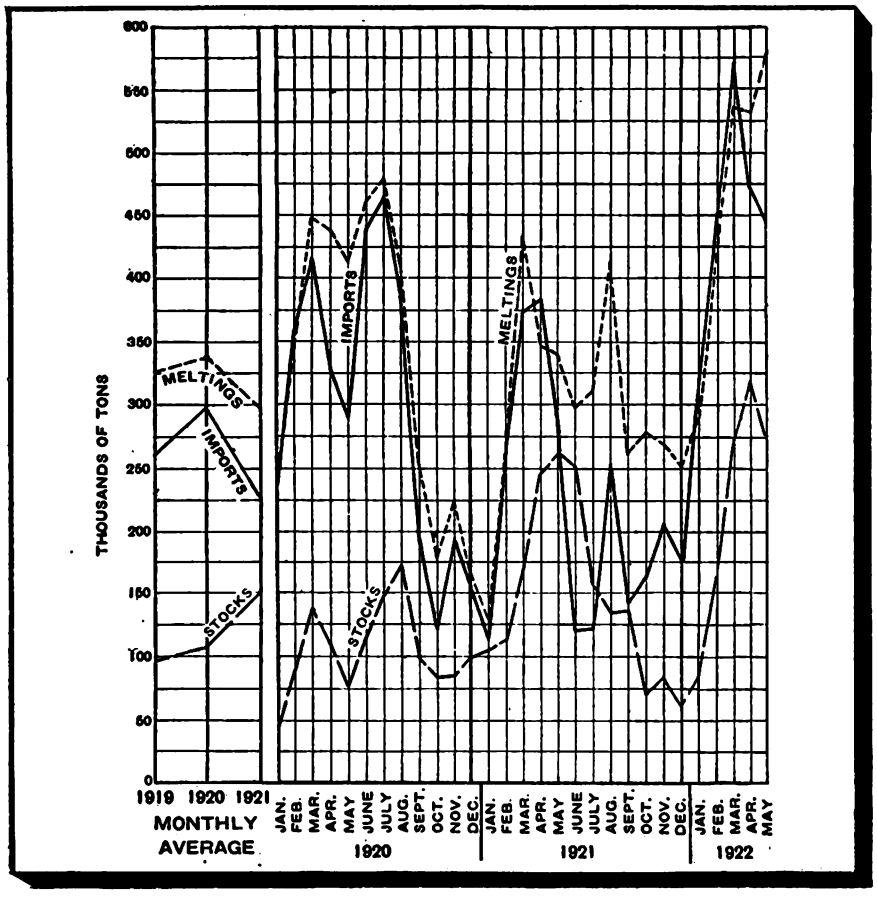
It is estimated that next January will find Cuba with a negligible carry-over, due to the demand from the United States and from abroad. The extent of this demand is indicated by the fact that in January, 1922, Cuba had a carry-over of 1,100,000 tons, and that the present crop for this year is expected to amount to more than 4,000,000 tons.

The increase in meltings and imports in the U. S., shown in the chart on this page, are indicative of the increase in consumption since the beginning of the year, and have been consistent with the advancing prices.

Sugar Industry in China. Description of native industry in western China. Estimated yield is about 150,000,000 lbs. annually. Technical conditions in district under review (Szechuen Province) are ideal for very large sugar industry. Modern crushing and grinding plant probably not justified at present because of cheap labor supply. H. K. RICHARDSON, *Chem. Met. Eng.,* 7-19-22, 2000 w. CJW.

Story of Sugar. Origin of sugar unknown. First mention of sugar cane in 325 B. C. Principal cane-growing countries are West Indies, India, Java, Philippines, Hawaii, South America, Egypt and Formosa. In United States Louisiana is great cane-growing State. Discussion of sugar plantation and sugar mill. Sugar consumption in 1921 in U. S. was about 4,266,775 tons, or about 90 lbs. per capita. *Sugar,* 8-22, 2500 w. CJW.

Beet Sugar Juices. Highest possible purification needs: thorough washing of beets free of soil, cossettes should be smooth and even cut, temperature in battery should not exceed 82° C., juice should be of high density, number of cells in actual diffusion should be greatest in given battery, cell next to head should be carried to highest temperature, pure water should be used in the battery, and the division of knives used not very fine. Determination of degree of purification is determined from routine analysis of the purities of the original pressed beet juice and of the diffusion juice. C. G. LEONIS, *Sugar,* 7-22, 1800 w. CJW.



(U. S. Bureau of Census)

Comparison of cotton crop with 1921 and average

Flavoring Extracts. General article No published standards for non-alcoholic extracts, but they must be true to name and have same strength as alcoholic flavor of same name. No quick and easy methods for determining quality of flavoring extracts. Best to have reputable chemist make analysis. M. A. POSEN, *Candy Manufacturer,* 7-22, 1000 w. CJW.

Ice Cream Standards. A collection of the laws of the various States regarding the ingredients of ice cream. Discussions of matters of general nature covering points likely to be misinterpreted also given. Additional information may be secured from the Department of Agriculture of any State. *Ice Cream Review,* 8-22, 2000 w. CJW.

New Practices in Ice Cream Industry. In not very distant future ice cream will be produced much more efficiently and economically than at present. Discusses refrigerator truck and cabinet. Suggests advance in manufacture of bricks. Larger business should result from sale of packaged ice cream rather than lower method of spooning from can. Cooperation within also necessary. F. E. MILLER, *Ice Cream Review,* 7-22, 1200 w. CJW.

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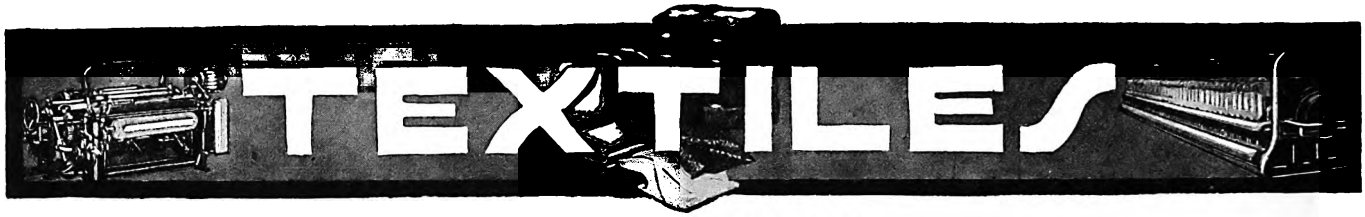
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Textile Prospects Not Bright

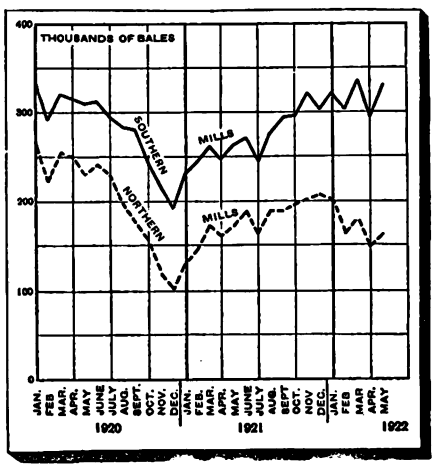
ALTHOUGH trade in textiles continues to expand gradually, recent developments in the rail and fuel situation are almost certain to curtail production in the textile manufacturing centers. Moreover, the fact that the prospect of a busy fall and winter caused an important group of New England manufacturers to yield to the strikers has resulted not only in a lack of uniformity in wages and hours of labor throughout the New England textile industry, but also as between Eastern and Southern mills. *The New York Commercial* points out that the wide disparity in operating costs and working conditions seems likely to prove more or less of an unsettling factor so long as it continues.

Trade in various lines of textiles is irregular. Silk goods departments of leading wholesale houses continue to enjoy a brisk demand from retailers, notably for crepes and sport fabrics of all descriptions. But although some broad silk manufacturers report a better call for these fabrics, the high levels at which raw silk is held is a serious handicap in planning and operating for the future. Jobbers continue to get somewhat higher prices for silks, but current prices in secondary markets for silk goods are still below present replacement costs. Staple domestic cottons are being bought more frequently and in larger volume, from jobbers. Trade in printcloths and gray goods has not improved to any appreciable degree, and it is believed that buyers and sellers will act cautiously pending the Government's crop report.

Acid Treatment of Cotton. A good discussion of a number of patents principally by Swiss inventors for the treatment of cotton fabrics with strong solutions of sulphuric acid with the purpose of producing a special character of finish which is said to give a lustrous, woollike appearance to the fibre. The finish obtained is really a very novel effect and is not simply one that seeks to imitate the quality and appearance of a wool fabric. It is quite possible that the new methods of treatment may prove in time as valuable as the mercerizing process itself. B. DEPUYSTER, *Color Trade Jour.*, 8-22, 4000 w. CJW.

Cotton Handkerchiefs. Manufacture present no special difficulties. Construction for most of these cloths is a plain lawn, from 7 to 8½ yds. per lb.; warp usually about 60 singles and filling between 90 and 105 singles. Some of best widths are 36, 39, 40 and 46 ins. Mark provided for cutter both in the width and in the length. Direction of warp indicated by leaving two or three dents empty. In color work draw in one gray cord which is visible. To make shearing or cutting mark in direction of filling several picks in one shed are shot in. System for cost and raw materials given. J. S. KASKEL, *Southern Textile Bull.*, 7-27-22, 750 w. CJW.

Surface Printing on Cotton. Among the various processes used to impress cloth with a pattern in more or less permanent dye colors are: hand-painted, handfilled, batik, madder style, copper plate, stencil, copper roller, surface roller and hand block. Surface printing has been recently reintroduced for cotton printing. Methods of distinguishing surface print from hand block print are given. First and important step is putting the artist's sketch on to the rollers. Each color is defined and transferred on to its separate roller, after which all are set up in the machine. Pressure of the impression must be carefully watched. All colors, with a few exceptions, are aniline dyes. Half-tones are usually produced by a less deep incision in the plate or roller carrying the full tone, but in surface printing this is accomplished by having the first roller come into contact with water or paste and impresses this



(U. S. Bureau of Census)

Cotton consumption in Northern and Southern textile mills. The unsettling factors in the Northern industry, mentioned at top of page, are reflected in the downward trend of the lower line and the relatively stable condition of the Southern mills.

on to all parts of the design where halftones are intended. ARTHUR WILCOCK, *Canadian Textile J.*, 8-15-22, 1800 w. CJW.

Finishing of Woolens. Efficient scouring requires soft water, neutral soap and alkali. Palm oil soap is quite as good for scouring as tallow soap. The alkali should be about 6° Tw. After scouring, fine fancy pieces should be hydroextracted as dry as possible and tentered at as low a temperature as possible. Brushing is a very simple operation, but cutting is a fine art. At present machines are used for blowing, in which the pieces, after steaming, are cooked by means of air drawn through by a vacuum pump. When heat and weight are judiciously applied, hand-papering and hydraulic pressing give a splendid and desirable finish to all the preceding processes. Potting and raising do much to perfect the finish of face cloths. It is a mistake to hurry pieces through the finishing department. A. JACKMAN, *Am. Dyestuff Reporter*, 8-28-22, 2000 w. CJW.

Woolen Weaving. An article by a practical manager intended for the instruction of young fixers. He discusses such subjects as cotton filling, filling kinking, bobbin splitting, hanging-off, harness skipps, etc. He emphasizes that these are important defects and gives a full detailed consideration of them. *Canadian Textile J.*, 8-15-22, 2000 w. CJW.

Dyeing Worsteds. Worsted piece goods should be scoured carefully with a clean soap solution containing a small amount of ammonia at temperatures below 120° F. Rinsing should follow with ample clean soft water. The fabrics are passed through the carbonizing sour standing at 8° Tw. until saturated evenly, squeezed and fed into the stove at 180° to 190° F. They are then brushed, neutralized with weak soda solution and washed. Bleaching is usually carried with peroxide or bisulphite. Three hundred gallons of water should be used for each 100 lbs. of cloth in dyeing. Skill of dyer is shown in matching the sample. Steam supply to the kettles is important. Another factor is maintenance of an even temperature in the dyebath. Dyes should be dissolved in 5-gal. tilting steam-jacketed copper kettles. Warm water should run into the kettle while the dye liquor is being run off. Pastel shades must be dyed upon bleached cloth with acid dyes, together with zinc oxide or chalk. Care in mechanical handling and thorough washing between processes are to be insisted upon. LEWIS J. MATOS, *Amer. Dyestuff Reporter*, 8-28-22, 2000 w. CJW.

Yarn Singeing. Fire is an ever-present matter of concern in yarn singeing. Modern mills are usually of concrete or slow-burning type of construction. Two exits required. Fire-fighting equipment enumerated. Storage bins should be lined with fireproof material and should be cleaned out frequently. Causes of yarn fires and means of prevention. Every beginner should be taught various methods of extinguishing fires. *Textile World*, 9-2-22, 1800 w. CJW.

Success has attended experiments in Madagascar in the use of spider web as a silk substitute.—*Steam Shovel and Dredge Mag.*

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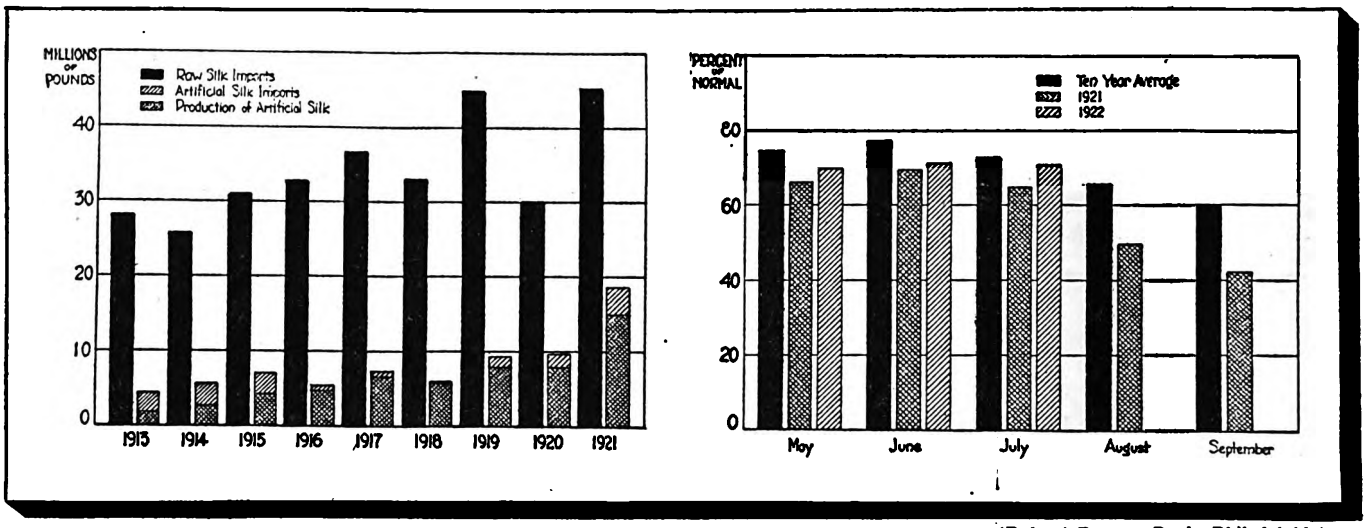
Mercerizing Yarns. The warps contain 378 ends and are balled 6000 yds. in length. These are placed on a rack supported by a bar. The warps enter the binding machine at the bottom, passing beneath a wooden roller. Forty-eight warps run through the binding machine having 16 tubes. As they leave the tubes they are bound by the cord in a spiral manner. A pitch of 10 to 12 ins. is satisfactory. These warps are boiled with weak caustic soda and turkey red oil, or with castor oil soap. They are then treated with caustic soda of 50° Tw. at a temperature of 60° to 70° F. The yarn is in contact with this liquor for about 2 minutes. The material is then washed on the counter-current principle, the water being heated to 120° F. It is next treated with 3% sulphuric acid at room temperature, thoroughly washed with cold water and passed through a weak solution of turkey red oil. On leaving the machine the warps pass directly to a series of drying cylinders. In order to obtain the best luster, only combed yarns should be used. Singeing or gassing the yarn prior to mercerizing adds considerably to the resultant luster. L. A. STEAD, *Textile World*, 8-26-22, 2000 w. CJW.

may be used in some cases in a neutral bath at 85° F. After silk has dried, slight stretching is applied in order to develop the gloss. Silk may be fixed with tartar emetic in a cold bath and then dyed with a basic dye. Examples of dyestuffs which may be used are given. Basic dyestuffs are compulsory when very brilliant shades are required. GEORGE EMMONS, *Am. Dyestuff Reporter*, 7-31-22, 1500 w. CJW.

Hand Processes. Hand processes have not proved consistently profitable lines to work. Much depends upon novelty and succession of novelties must be kept up, involving continual change of business. Fancy effects obtained by dyeing squares of Japanese silks with aid of resists, chemical or physical. Tie-and-dye process gives irregular patch which is then treated with color from spray. Graftons have effected improvements in cotton prints which result in depositing fuller body of color upon fabric. Fast-dyed artificial silks are predominantly in black and gold or blue and silver with scroll and floral effects, but some reproduce antique furnishing styles. Difficulties in dyeing retard development of

Bleaching and Dyeing of Hair. Bleaching of hair depends on oxidation of hair pigments. May be accomplished by use of hydrogen peroxide. Effect of dye upon hair may be physical or chemical. Physically acting hair dyes are seldom used. Recipes given for blond and black hair powders. Dyes may be ochres or bone black. India ink or Cassel brown may be used in alcohol or ammonia solution. M. BACHSTEZ, *Color Trade Jour.*, 8-22, 1000 w. CJW.

Wet Cleaning and Bleaching. Discussion of the more complicated and difficult problem of water brushing and washing colored fabrics. Three wet processes are available. Wet-dry process consists of saturating the garment with gasoline and water-brushing with cold water in usual manner. Advantage lies in water-resisting action of gasoline in fabric. Increased by dissolving substances possessing high water-resisting properties such as paraffin, stearic acid, etc. Gasoline bath prepared by dissolving one-half pint aceton and one-half ounce acetic acid with or without 1 qt. of stock solution of paraffin in 5 gals. of gasoline. Process sometimes more effective by use of soapbark extract.



(Federal Reserve Bank, Philadelphia)

Raw and artificial silk imports and production.

Comparison of cotton crop with 1921 and average.

Weighting of Silk. Sodium phosphate is next in importance to tin liquors. Physical and chemical properties are given. Impurities are the sulphate, chloride and carbonate. Good commercial sample should contain 98% phosphate with 12 waters. Customary bath contains 130 to 200 grams per liter, or 1 to 1.75 lbs. per gallon. Ordinary and rapid methods of analysis both of phosphate and of impurities. E. CAGLIOSTRO, *Color Trade Jour.*, 8-22, 1500 w. CJW.

Dyeing Viscose Silk. Artificial silk weakens in the dyeing bath, which means careful mechanical handling. Bleaching may be done by a weak solution of chloride of lime. In general, discose silk is dyed with direct cotton dyes. The temperature is maintained at 120° to 140° F. Time required about 1 hour. Basic dyes

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Hydrogen peroxide 1566
Color in relation to dyeing 1566
Dyeing of blocks 1566
Primary hp. in manufacturing groups.....1570
Exports and imports 1558
26,000 strikes in ten years 1555

acetyl silk. Madras curtain fabrics in colored designs are being used extensively for summer dresses. J. A. HUNTER, *Textile World*, 7-29-22, 750 w. CJW.

Waterproofing Textiles. Two general classes to be waterproofed are coarse fabrics, such as awnings, tents, canvas covering, etc., and finer fabrics, such as overcoatings, raincoatings and umbrella silks. The coarser materials may be treated with a mixture of paraffin wax and rubber or may be smeared with viscose solution. Pyroxylin or cellulose acetate may also be used. Finer fabrics are treated with soap and aluminum acetate. Difficulty is that fiber is harsh. M. Y. YORGANJIAN, *Textile World*, 8-28-22, 750 w. CJW.

Out of the total of 803,598 bales of hemp exported from the Philippines in 1921, Japan bought 168,390, or more than one bale in five. She is still buying, chiefly the lower export grades, and hemp men say that altogether her activities in the hemp market have been beneficial.—*Pacific Ports.*

Ordinary water-brushing operations on colored silk, wool or cotton fabrics carried out in same manner as in wet-dry process omitting gasoline bath. ROY DENNEY, *National Cleaner and Dyer*, 9-22, 2000 w. CJW.

Carpet Cleaning. Cleaning of carpets prolongs life because process of wet cleaning tightens up whole structure by shrinkage and raises up the pile, through action of vacuum machine. Suction of this machine removes water that would ordinarily have tendency to mat the pile. Pressure of foot is on end instead of along full length of wool nap, as is case when nap or pile is crushed down. Wet cleaning also livens up fabric and makes it resisting to wear. G. W. MINUTH, *Canadian Dyer & Color User*, 7-22, 500 w. CJW.

Related Advertising

Insuring checks against loss through fraudulent alteration 1577
Complete industrial engineering service...1530
Reliable investment securities.....1583
Reducing handling costs.....1527
Government auction sales of industrial equipment 1586-7



A Model in Highway Construction

THE section of the Lincoln Highway now being constructed in Lake County, Indiana, promises to be one of the most carefully studied sections of highway in the world. The fact that it will cost $100,000 a mile is in itself noteworthy, but the chief interest lies in the ideas embodied in the design. The plan calling for 40 feet of ten-inch reinforced concrete pavement, capable of carrying a traffic of 20,000 vehicles a 24-hour day, one-quarter of which are estimated to be heavily laden trucks, impresses the desirability of permanency in modern highway investments on main routes of travel. The width also makes for safety and facility of operation. It is pointed out that the absence of drainage ditches at the side of the road further inculcates the safety idea, while the night illumination increases the road's efficiency by permitting a heavy volume of night traffic without danger. The beautification of the roadline is in line with steps now being taken by the most advanced highway departments which are realizing that too little attention has been given in this country to the importance of a proportionately small expenditure to realize the greatest beauty of the roadside.

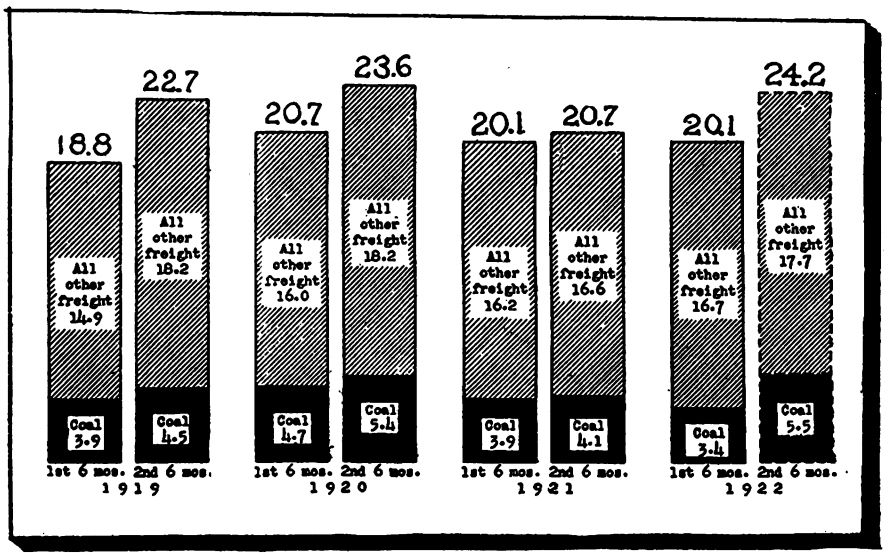
The lighting system also marks a decided improvemnt in highway illumination. A group of reflectors is used—a nest of three, one within the other. These reflectors serve to collect the light that would be reflected upward and outward over the adjoining fields and project it on the surface of the road, at the same time preventing the annoyance and danger of glare. *The Exporters and Importers Journal* points out that the degree of the efficiency of the lighting unit may be gathered from the fact that with a 250-candle-power lamp in the fixture, 3700 candle-power is obtained from each end of the reflector.

Another feature of the road is the system of marking used. At regular intervals, visible from one to the other, signs, enameled in red, white and blue with the initial L in blue on white, are set up at convenient height on stout four-inch hardwood posts, so that there can be no mistaking the route.

Advantages of Railroad Electrification. This is an answer to the question repeatedly raised recently, why electrify steam tractions? This question has been raised because of the strong tendency which has been noted in the direction of electrification of steam road since the end of the war. The author answers the question by taking up the inherent characteristics of the steam and electric locomotive and comparing them, the methods of operating the two kinds of roads and comparing them, and in all this detailed argument finds for the electric power in almost every case. He gives other advantages of electrification, and above all, the economic advantages. Very interesting the steam and electric road executives as foreshadowing a remarkable modern tendency in transportation. R. J. O'BRIEN, *The Electric Journal*, 6-22, 8900 w. MAH.

Latest Developments of Trackless Trolley in Great Britain. The trackless trolley is but another attempt of the tractions to get out of their present losing situation. In general it consists of the usual overhead equipment, the rolling stock being in the form of electrically driven motor busses, with a flexible swivelled overhead connector or pantograph. They have many advantages over the ordinary trolleys and have proven more flexible and, apparently, more economical. This article describes a number of British installations, gives data on each, figures of the results obtained, popularity attained, etc. *Electric Tractor*, 7-22, 2900 w. MAH.

A new type of automatic coupler for railroad cars couples the air, steam and signal pipes, as well as the cars.—*Steam Shovel & Dredge Mag.*



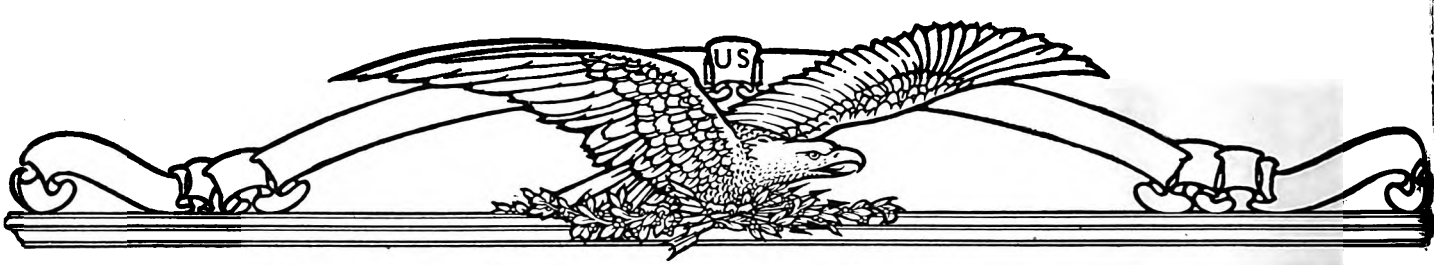
Millions of carloads of railroad freight by half years since 1919, with estimate for second half of 1922. The figures indicate a record year for 1922.—*(Cleveland Trust Co.)*

How Electric Rates Are Fixed under Commission Regulation. Analysis of methods employed by California State Railroad Commission in determining basis upon which returns are to be allowed and in distributing burden fairly between classes of service. Fixing of rates for any class of electric service requires much careful study and consideration of (1) cost of service and its segregation between classes; (2) value of service; (3) history of development of business under existing rates; (4) elimination of discriminatory rates; (5) psychological effect on public of different forms of rates. Operating and maintenance expenses are determined for given utility from careful consideration of its actual expense and reasonableness of same. Proper annual depreciation allowance must be made. It was found that an annual return of 8% on rate basis is reasonable compensation for use of money invested in electric utility industries. Psychological effect of the rate on the consumer is not forgotten; consumer must be kept happy and not antagonized. L. S. READY, *Jour. of Elec. & Western Industry*, 7-15-22. IG.

Railroad tickets are now printed while you wait. The agent adjusts a small dial for the station desired, presses a button, and the machine both prints the ticket and makes a record for the auditor's office. This eliminates bookkeeping for the agent.—*Steam Shovel and Dredge Mag.*

Related Articles

Future of electric trucks 1563
Excellent prospects for paint.....1566
Primary hp. in manufacturing groups....1570
Penalty for high coal prices 1570
Electric arc welding in locomotive work 1577
26,000 strikes in ten years 1555



WAR DEPARTMENT

SEPTEMBER

Sept. 25—ORDNANCE MATERIAL. Aberdeen, Md. Auction. For catalog write C.O., Aberdeen Proving Grounds, Aberdeen, Md.

Sept. 26—Q.M. SUPPLIES. New Orleans, La. Auction. For catalog write C.O., Q.M. Surplus Property Depot, Atlanta, Ga.

Sept. 27—ORDNANCE MATERIAL. Watervliet, N. Y. Auction. For catalog write C.O., Watervliet Arsenal, Watervliet, N. Y.

Sept. 28—Q.M. SUPPLIES. Camp Devens, Mass. Auction. For catalog write C.O., Boston Genl. Intermed. Depot, Boston, Mass.

Sept. 29—Q.M. SUPPLIES. Norfolk, Va. Auction. For catalog write Q.M.S.O., 1st Ave. and 59th St., Brooklyn, N. Y.

OCTOBER

Oct. 3—Q.M. SUPPLIES. Camp McClellan, Ala. Auction. For catalog write C.O.Q.M., Surplus Property Depot, Atlanta, Ga.

Oct. 4—HARNESS. Jeffersonville, Ind. Auction. For catalog write C.O., Q.M. Genl. Supply Depot, Jeffersonville, Ind.

Oct. 4, 5, 6—ORDNANCE MATERIAL. Erie Howitzer Plant, Pa. Auction. For catalog write C.O., Frankford Arsenal, Philadelphia, Pa.

Oct. 5, 6—Q.M. SUPPLIES. Camp Knox, Ky. Auction. For catalog write Q.M.S.O., 1819 W. Pershing Rd., Chicago, Ill.

*Oct. 10—MEDICAL SUPPLIES. New York City. Auction. For catalog write Surplus Property Sect., Office Surgeon General, Washington, D.C.

Oct. 10—AIR SERVICE EQUIPMENT. Dorr Field, Fla. Auction. For catalog write Commanding Officer, Dorr Field, Fla.

SELLING PROGRAM

Oct. 11, 12—AIR SERVICE EQUIPMENT. Carlstrom Field, Fla. Auction. For catalog write Commanding Officer, Carlstrom Field, Fla.

Oct. 17—Q.M. SUPPLIES. Camp Dix, N. J. Auction. For catalog write Q.M.S.O., 1st Ave. and 59th St., Brooklyn, N. Y.

Oct. 24—AIR SERVICE EQUIPMENT. Montgomery, Ala. Auction. For catalog write C.O., Air Reserve Dept., Montgomery, Ala.

*Oct. 27—MEDICAL SUPPLIES. Washington, D. C. Auction. For catalog write Surplus Property Sect., Office Surgeon General, Washington, D. C.

Oct. 30—AIR SERVICE EQUIPMENT. Richmond, Va. Auction. For catalog write C.O., Air Reserve Depot, Richmond, Va.

NOVEMBER

Nov. 14—AIR SERVICE EQUIPMENT. Long Island, N. Y. Auction. For catalog write C.O., Air Service Depot, Long Island, N. Y.

Nov. 14—Q.M. SUPPLIES. Camp Lewis, Wash. Auction. For catalog write Q.M.S.O., Ft. Mason, San Francisco, Calif.

*Nov. 16—MEDICAL SUPPLIES. Philadelphia, Pa. Auction. For catalog write Surplus Property Sect., Office Surgeon General, Washington, D. C.

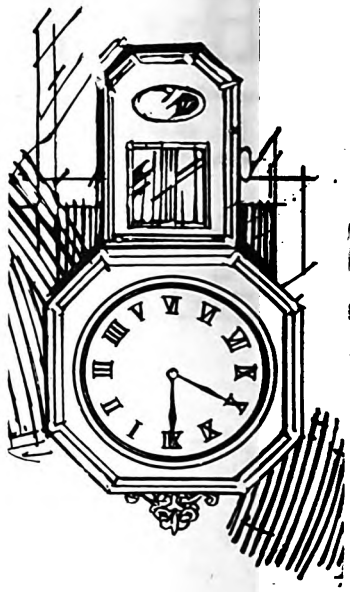
*Nov. 21—Q.M. SUPPLIES. Camp Knox, Ky. Auction. For catalog write Q.M.S.O., 1819 W. Pershing Rd., Chicago, Ill.

*Nov. 30—Q.M. SUPPLIES. San Antonio, Tex. Auction. For catalog write Q.M.S.O., Ft. Sam Houston, San Antonio, Texas.

*Sales dates indicated by the asterisk are as yet only tentative.

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ARTMENT

Colossus of Roads

(*From page 1544*)

but further than that, only two other months (May and June of this present year) have, in the history of the industry, shown a greater output.

"This, it seems, is the very antithesis of what might be expected to happen if times were hard. To date, the railroad and coal strikes have had little or no effect upon the automobile business. A long continuation, which is doubtful, would, however, affect production—but not the demand.

"In the earlier years when automobile buying was pounding along at a great rate, there were quite a number of wise people who pointed out warningly that at the rate at which automobiles were being bought, there would some time, perhaps soon, come about a situation when the world would be so full of automobiles that no more could be sold. This was confidently predicted. The term 'saturation point' was adopted in automobile liturature and has been used for years. It is, however, misleading. Most people take it to mean that period when, having reached the peak of production, cars are being built only to replace those already in use. This, in itself, is also misleading, as we can never reach such a truly balanced condition. There will always be new buyers—that is, buyers who have never before owned a motor car.

"If 'saturation point' means simply the peak of production, it would be a movable point and would last only for a limited period. This is because population and miles of good roads are constantly increasing and more and more automobiles will be used, barring the almost remote possibility of some other method of locomotion being developed that is cheaper and safer, and also barring political and financial disaster.

"It seems reasonable to presume that if the country continues prosperous in a fair degree and this prosperity is well distributed, a minimum average of 2,000,000 cars per year of all kinds can be safely marketed over a period of five years. Then, if conditions remain the same, there ought to be a fair increase from time to time thereafter.

"Statistics show that the population increases on the average about 1,000,000 a year, and out of this increase there will always be a certain number of new buyers. In addition to this, there will always be a number of new buyers among the present population who have not before owned a car.

"Undoubtedly the world will continue to transport itself from point to point on wheels that are motor propelled, and it would be a brave man who would attempt to prophesy the total number of motor cars that can be used in the United States at any one time. But it is not out of the possibilities to believe that in the next 20 years there will be 25,000,000 cars in use in this country alone.

"In the great industrial activity which is taking place, there has been some question whether the high cost of material, and especially of labor, has not made profits in many lines very small or wiped them out altogether. This, however, from the best information we can obtain, has not been the case in the automobile business. Profit, we understand, has not been reduced on account of labor and material costs, as profits in many instances have never been so high per car or per dollar of investment as is the case at present. Many companies bid fair to make more money this year than ever before in their history. Others will not reach the peak in profits made several years ago, but all well-managed automobile companies will, according to the best opinion in the trade, make all of the profits this year that they are justly entitled to.

"The prospects for automobiles this fall are estimated to be emphatically good if strikes are settled and there is no injury to crops. As to next year's prospects, it is beleived that about the same quantity ought to be produced as this year but at lower prices, and probably with correspondingly lower profits. But even so, it is thought that this will not be an undesirable condition, as many companies made an abnormal profit per car this year and one that they can hardly justify except on the theory that one is entitled to all that one can get."

Gliders

(*From page 1547*)

of aeronautical studies.' Several large halls like gymnasiums were inclosed in wire. Secret experiments began with scores of captive gulls and swallows. Other birds of flight were used, but only those capable of swift maneuver, like swallows, and of long distance, like sea gulls, were studied minutely.

"The birds first were filmed flying in all directions. Then the films were projected on a screen at reduced speed, and gave the first secrets of wing span and detail of flight movements.

"A plan suggestive of this was tried during the war by American aviators who studied the flight of bats in dodging wires stretched across a room, but only for the purpose of learning how to turn in flight.

"The group of German experts was then divided up into sections. One made a special study of wing action, another concerned itself only with the tip of the wing, another studied action of the tail feathers, another the head. Some studied the gull, some the swallow, and a different group devoted itself entirely to currents of air.

"These experiments continued for two or three years without any attempt at constructing a single plane. Every detail was charted and an experimental plane was discussed, when one scientist observed a curious fact—the birds invariably kept their heads in a slight irregular movement while in flight. It was imperceptible to the naked eye, but the head-on flight toward the moving-picture lens revealed this movement, as if the bird were feeling its way through the air.

"The whole school then specialized on the head phenomena. The result of months of study convinced the Germans that birds have under their light head feathers an anatomical mechanism which virtually feels the air and synchronizes with the muscle control of their wings and tail in directing flight.

"Consequently all experimenting was directed toward perfecting a similar 'air feeler' for a man pilot.

"Currents of air were shot at birds from all angles, and the manipulation of their heads in these currents proved the theory.

"The final work was in the development of human power to feel the air. In these experiments the Germans used thistledown on cardboard over which air currents were directed. Pilots thus began an almost visual study of air currents. Later their own faces were treated with some material which renders the skin of the face highly sensitive.

"The first pilots began experimenting exactly as birds. They had already learned that the secret of air pressure on wing planes was simply controlled by the tip of the wing and is easiest in the upward current, because the turned-down tips hold the upward current like an inverted cup. The pilot then keeps on upward currents by the use of his sensitive 'bird head.'

"It was determined early that wing flapping was not essential to flight. Eagles and gulls can be seen flying without a movement of the wing except at the tip.

"The success of the experiments was aided further by a huge bowl-like valley where all currents were upward. Early experiments would have been impossible on a plateau with varying currents. It is with the elementary mastery of the upward current that the Germans finally began working with other currents until they achieved the remarkable successes of the past week.

"The German aviator who gave these facts declared that mechanical perfection is secondary, and that from today on the pilot is the essential element. He frankly added, however, that in assuming this unnatural air sense the pilot is subjected to a most intense nervous strain—as every particle of buoyancy in the air fluid is sought for by the pilot and utilized by the brain power of the man, whereas the bird, with one of the smallest brains in the animal kingdom, merely uses instinct."

A New Aluminum Alloy

A NEW aluminum alloy has been developed which is sold under the name "silumin." It is the invention of a German and contains 11% to 14% of silicon and 86% to 89% of aluminum. It is unaffected by wet steam and resists concentrated nitric acid better than aluminum. The alloy is made from its elements in the electric furnace or directly.

New Shale Oil Machine

A NEW machine for reducing oil from shale rock is at work near Denver. The invention is a series of revolving retorts, heated by oil burners. The rock is dumped in the hopper and comes out as black dust made up of hydrocarbons of high commercial value. According to the president of the Colorado School of Mines, the invention will revolutionize the oil industry.

With the Financiers

(From page 1554)

great sums of loanable funds are idle, for otherwise the banks would not hold heavy investments; and it also helps explain the high level and the steadiness of the bond market. When this bank call was made the bankers were still bidding actively for good securities, and apparently are still doing so.

Mr. Crissinger reported that since May the national banks had reduced their liabilities to other banks and bankers by $47,000,000. Bills payable and rediscounts combined were reduced $26,000,000 since May, and $963,000,000 since June, 1921.

"The decided reduction," Mr. Crissinger said, "in the liability of national banks for bills payable, representing all obligations for borrowed money, which took place in the 15 months preceding June 30, 1922, together with similar reduction on account of rediscounted paper, is evidence of the fact that our national banks are 'standing on their own stilts,' so to speak; are in a position, and abundantly able, and are in fact in a better position to take care of the requirements of commerce and industry made upon them than they have been at any time since the signing of the armistice."

High-Grade Bonds Wanted

NEW bonds are now being issued in larger volume. Investment demand has been good, and most listed issues have recorded advances. The complaint of investment bankers is not that the public is unwilling to buy, but that there are not enough first-class issues being placed on the market to supply the seekers for sound investments. As the fall advances, however, a number of good offerings are expected.

The call for tax-exempt bonds is greater than ever, and these issues are being sold at a lower yield than at any other time since the war. In the week ending September 9 no less than ten issues of this kind were marketed at prices to yield 3.95 to 4.75%.

"Fine As Silk"

(From page 1549)

"Another factor militating against profitable silk manufacturing lies in the ease with which irresponsible men . . . can engage in the business. Credit, both for machinery and raw material, is too cheap. The enlightened self-interest of the raw silk dealer and the machinery producer should enable them to see that stability of industry does not come through reckless and indiscriminate competition, but through the fostering of the legitimate factors in business. Concerns of this character exercise a very prejudicial effect on our whole industry through their failure to comprehend and put into effect fundamental laws that are essential to the upbuilding of any profitable business. Overhead, depreciation, marketing costs, are all ignored. They have no originality themselves, nor do they purchase any; a cloth is brought out by a reputable manufacturer through the expenditure of much time, thought, energy and money; it meets with favor, is copied and is imitated as best it can be by these irresponsible factors, and sold at a price that, after all is said and done, is in keeping with its intrinsic worth, but which has a tendency to bring to its price level the article that it so poorly imitates."

Daugherty's Dud

(From page 1535)

meditation and prayer. But this was never the intent of the Government, we are now informed.

"This placatory deliverance by the White House is doubtless preliminary to a great change in the terms of the injunction when it comes up for a final hearing. The thing has palpably gone ill with Congress and the country. The expected enthusiastic rallying of citizens in support of a majestic Department of Justice did not come off. We may now expect to hear fewer grandiloquent words from Attorney-General Daugherty, while loose and irresponsible conversation about him will go on freely."

A subsequent editorial in the same newspaper is headed, "Injunction Reduced to Farce," which seems to express a fairly widespread attitude.

Sound the Depth

Sound the depth of the 1921 depression.

Practically every index of production or distribution such as steel, pig iron, lead and copper production; car loadings and U. S. Postal receipts touched bottom in July 1921. July 1921 was the depth of the depression.

In February 1921 the Brookmire Service forecasted July 1921 as the depth of the depression. Brookmire clients had six months' notice—and prepared accordingly. Even the most pessimistic will admit that business has improved.

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The INDUSTRIAL CALENDAR

Secretaries of Associations are invited to send us the dates of their conventions as early as possible so that their conventions may be properly listed below. When especially requested by Association Secretaries, we will send dates and other available notices concerning meetings of other associations.

Sept. 19-22. *Pacific Coast Gas Assn.*, Santa Barbara, Cal. (W. M. Henderson, Secretary, 445 Sutter St., San Francisco, Cal.)

Sept. 21-23. *American Electrochemists Society*, Hotel Windsor, Montreal, Canada. (Dr. Colin G. Fink, Secretary, Columbia University, New York City.)

Sept. 21-23. *Telegraph and Telephone Section of the American Railway Association*, the "Antlers," Colorado Springs, Colo.

Sept. 23-27. *National Assn. of Cost Accountants*, Atlantic City, N. J.

Sept. 23-30. *New York Closed Car Show*, Grand Central Palace, New York.

Sept. 25-29. *American Institute of Mining and Metallurgical Engineers*, San Francisco, Cal. (F. F. Sharpless, Secretary, 29 W. 39th St., New York City.)

Sept. 25-28. *Illuminating Engineering Society*, Boston, Mass. (Clarence Law, Seccretary, Irving Pl. and 15th St., New York City.)

Sept. 25-28. *Southwest Water Works Association*, Arlington Hotel, Hot Springs, Ark.

Sept. 25-29. *National Association Retail Druggists*, Detroit, Mich. (S. C. Henry, Secretary, 168 N. Michigan Blvd., Chicago, Ill.)

Sept. 25-29. *National Drainage Congress*, Kansas City, Mo.

Sept. 25-30. *American Society for Steel Treating*, Detroit. Tentative.

Sept. 25-30. *National Association Advertising Specialty Mfrs.*, Chicago, Ill. (B. Blackwood, Secretary, 208 S. LaSalle St., Chicago, Ill.)

Sept. 26-30. *National Assn. Ry. & Utilities Commissioners*, National Convention, Detroit, Mich. (James B. Walker, Secretary, Pelham Manor, N. Y.

Oct. 2-4. *Grain Dealers National Association*, New Orleans, La.

Oct. 2-6. *American Society for Municipal Improvements*, Cleveland, O.

Oct. 2-6. *American Bankers' Association*, Hotel Commodore, New York. (W. G. Fitzwilson, Secretary, 5 Nassau Street, New York City.)

Oct. 2-7. *American Society for Steel Treating*, General Motors Building, Detroit, Mich. (W. H. Eisenman, Secretary, 4600 Prospect Avenue, Cleveland, Ohio.)

Oct. 2-7. *Fire Prevention Exposition*, office 405 Lexington Avenue, New York City. (A. E. MacKinnon, Director of Exhibits.)

Oct. 4-5. *National Association of Cotton Manufacturers*, Hotel Traymore, Atlantic City, N. J.

Oct. 4-9. *American Society of Civil Engineers*, San Francisco, Cal.

Oct. 7-11. *Investment Bankers Association of America*, Del Monte, Cal.

Oct. 7-14. *Second National Aero Congress and National Airplane Races*, Detroit, Mich.

Oct. 7-14. *Annual Electric Progress Show*, Grand Central Palace, New York City. (N. Maul, Secretary, 130 East 15th Street, New York.)

Oct. 9-11. *National Council of Traveling Salesmen's Associations*, Cincinnati, O.

Oct. 9-11. *American Gear Manufacturers Association*, Chicago, Ill.

Oct. 9-13. *American Society for Municipal Improvements*, Cleveland, O.

Oct. 9-14. *National Association Electrical Contractors and Dealers National Convention*, Cincinnati, O. (Farquson Johnson, Secretary, 15 West 37th Street, New York City.)

Oct. 9-14. *American Mining Congress*, Public Hall, Cleveland, O. (E. C. Porter, convention manager, Hollenden Hotel, Cleveland, O.)

Oct. 10-12. *South Central Gas Association*, Hot Springs, Ark. (S. J. Bollinger, Secretary-Treasurer, San Antonio, Tex.)

Oct. 11-13. *National Federation of Implement Dealers' Association*, Chicago, Ill. (H. J. Hodge, Secretary, Abilene, Kan.)

Oct. 11-14. *Association of Edison Electric Companies*, New York City. (Preston S. Millar, Secretary, 80th St. and West End Avenue, New York City.)

Oct. 16-18. *National Association of Ice Cream Manufacturers*, Hollenden Hotel, Cleveland, O.

Oct. 16-21. *"Management Week" of the American Society of Mechanical Engineers* (The Society of Industrial Engineers and The Taylor Society co-operating). (Calvin W. Rice, Secretary, 29 West 39th Street, New York City.)

Oct. 17-19. *American Railway Bridge and Building Association*, Cincinnati, O. (C. R. Lichty, Secretary, Chicago & North Western Ry., 219 North Waller Avenue, Chicago, Ill.)

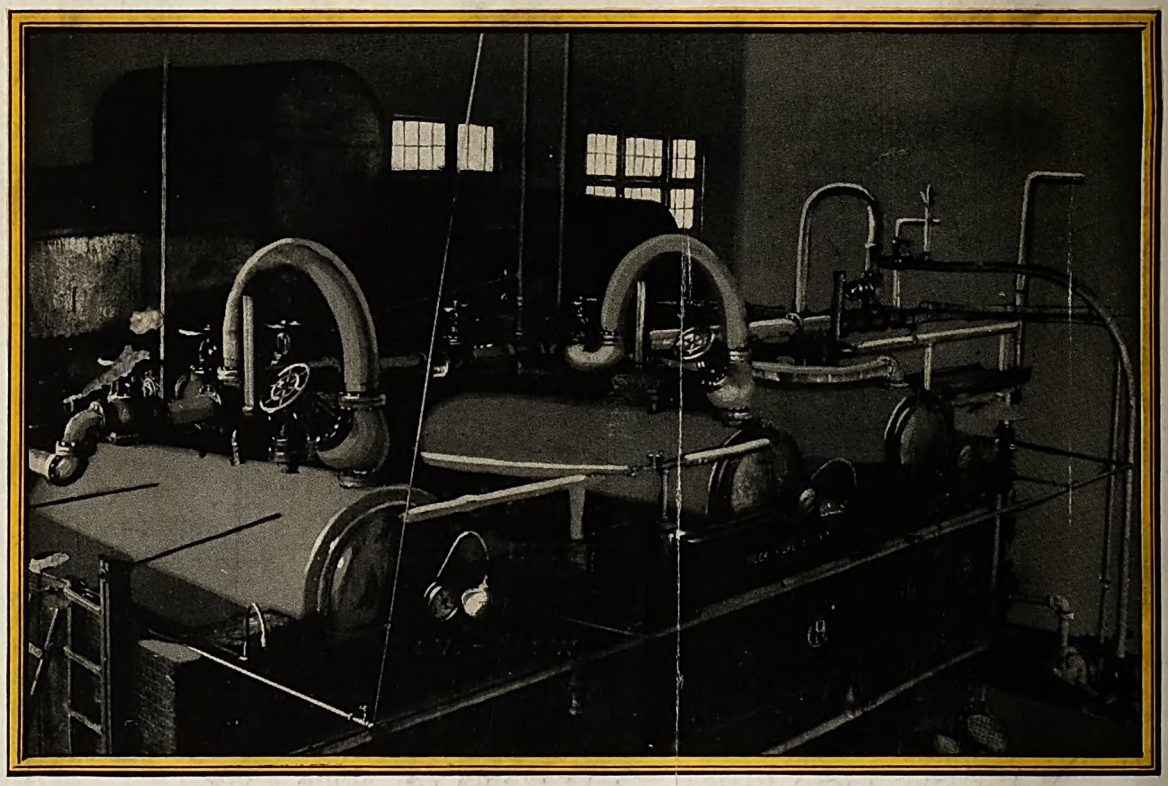
Oct. 17-21. *Association of Ice Cream Supply Men*, New Cleveland Public Hall, Cleveland, O.

Oct. 18-20. *Society of Industrial Engineers*, McAlpin Hotel, New York City. (George C. Dent, Business Manager, 327 S. La Salle Street, Chicago, Ill.)

Oct. 18-20. *National Association of Farm Equipment Manufacturers*, Chicago, Ill.

Foreign Events

September. *Sociedad Rural Argentina*, Buenos Aires, Argentina.
Sept.-Nov. *Engineers Congress*, Rio de Janeiro, Brazil.
Sept. 7-Nov. 12. *International Exposition (centennial)*, Rio de Janeiro, Brazil.
Sept. 15-20. *Automobile Show*, The Hague, Holland.
Sept. 18-23. *Second Annual Meeting of the International Chamber of Commerce*, Rome, Italy.
Sept. 21. *Textile Fair*, Hamburg, Germany.
Sept. 22-25. *Fifth International Fur Fair*, Lucerne, Switzerland.
Sept. 25-Oct. 3. *Automobile Show* at the Kaiserdamm Hall, Berlin, Germany.
Oct. 1-15. *General International*, Lyons.
Oct. 4-15. *Automobile Show*, Grand Palais, Paris, France.
Oct. 12-23. *International Commercial Vehicle Exhibition* at Olympia, London, England.



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The INDUSTRIAL DIGEST

September 30

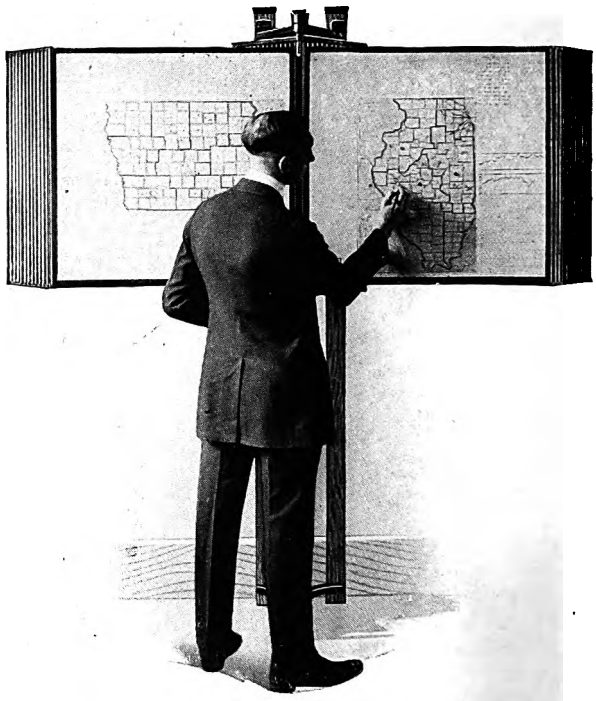
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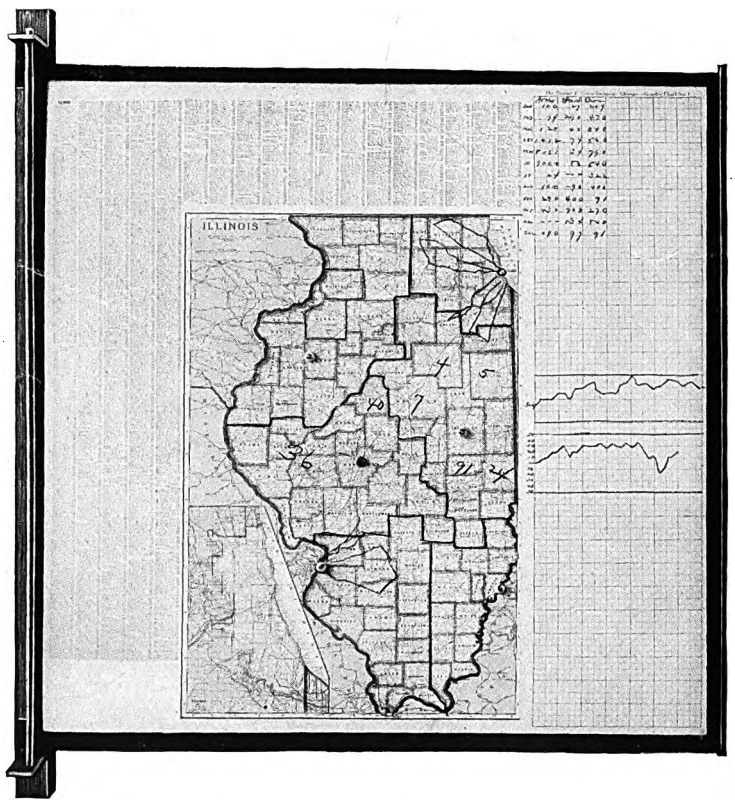
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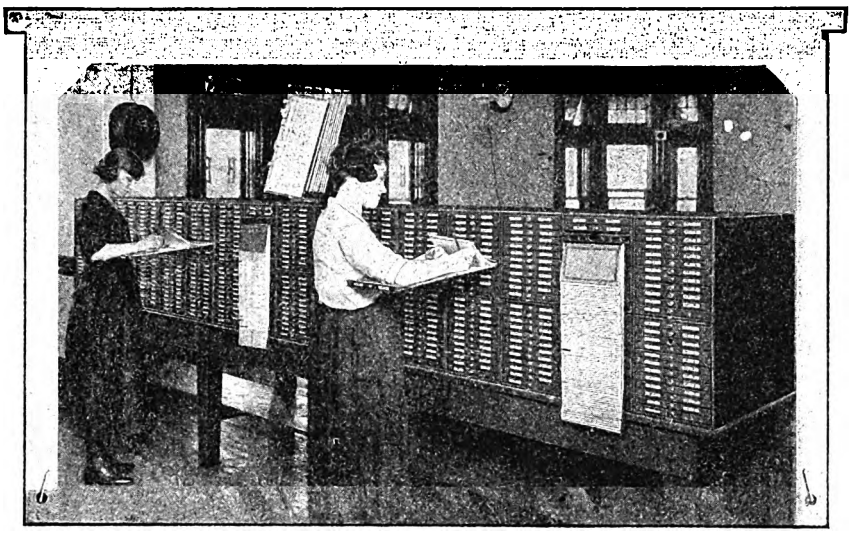
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THE INDUSTRIAL DIGEST

A fortnightly digest of the informative articles in one thousand leading industrial magazines covering thirty industries

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Of Interest to Executives Only

THE difference between an executive and an employee is a matter of *judgment.* That is to say, the executive makes decisions and the employee carries them out.

As an executive you are called upon to exercise your judgment on thousands of intricate business problems. That judgment must be based on your knowledge or belief of facts and conditions.

The range and reliability of the information on which your judgment is based will be—to a large extent—the measure of your ability as an executive. Now, the difficulty with which the average executive is faced is the practical impossibility of reaching and reading all the sources of information which might be valuable to him in his business. If a business doctor were to prescribe the reading for the first-rank executive he would be likely to include 40 or 50 leading newspapers, two or threescore general magazines, some 600 trade and technical publications, a dozen economic and statistical services, and an enormous mass of governmental, trade commission, and trade association material. It would be impossible for the average business man to read even one-tenth of this matter—and yet from each of these sources he would draw something of profit to his daily work.

If you, realizing the enormous importance of authoritative and accurate information, could employ a staff of 25 industrial experts to read this material, slowly and carefully, and to eliminate all of the waste matter which would have no value to you, and then to condense and classify this material into a fortnightly report—you would be in possession of facts and ideas which would make your judgment infinitely more valuable to your firm and yourself.

That Is What the Industrial Digest Has Done for You

SUCH a report would naturally be arranged so that you could instantly place your finger upon all of the information concerning any subject on which you might need instant information.

You would like to have a condensed review of the important happenings of the past two weeks as they affect business conditions. (See page 1600.)

You would like a brief summary of the opinion of economic authorities as to what to expect in business. (See page 1599.)

Very probably you would like to be informed regarding labor conditions in your own industry—and as they affect business conditions in general. (See pages 1614 and 1623.)

A financial résumé telling you what to look for in money rates and market conditions would be worth while. (See page 1622.)

A review of the important ideas in management would be of tremendous importance. (See page 1624.)

You would be interested in reading at a glance the vital production figures regarding the leading industries. (See page 1620.)

You would doubtless want to keep in touch with the trend of prices. (See page 1621.)

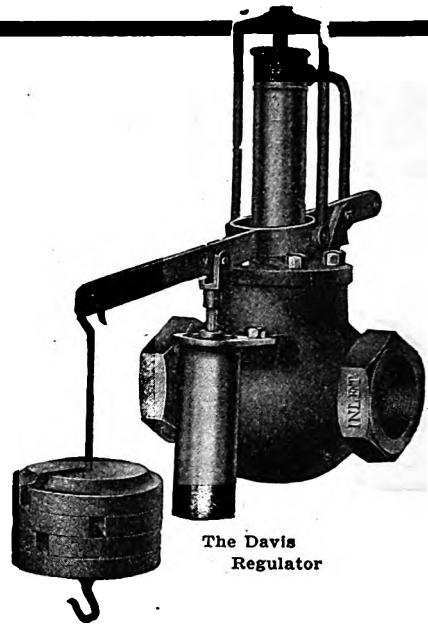
To find the best advertising ideas condensed and collected in one part of the report would be of great value. (See page 1628.)

To read the consensus of opinion regarding the important happening in your particular industry (and in industries related to yours) would be, perhaps, the most directly profitable information which you could have. If you will turn to the index of industrial conditions you will be able to read this consensus in thirty seconds by turning to the proper page.

To find all of the *new* and progressive ideas published in magazines covering your industry (and in other magazines which you very probably never see) would be worth thousands of dollars a year to you. You will find this collected and condensed for ten-minute reading on the same page.

If you will simply consider THE INDUSTRIAL DIGEST as a comprehensive and condensed report covering all the information of value to you as an executive, you will find that it is an enormous time-saver and the most effective reading aid which can be devised.

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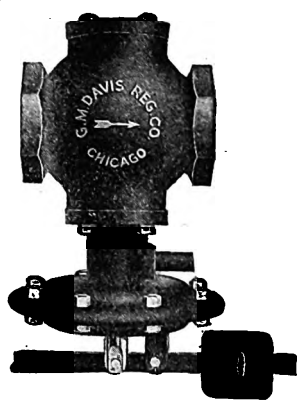
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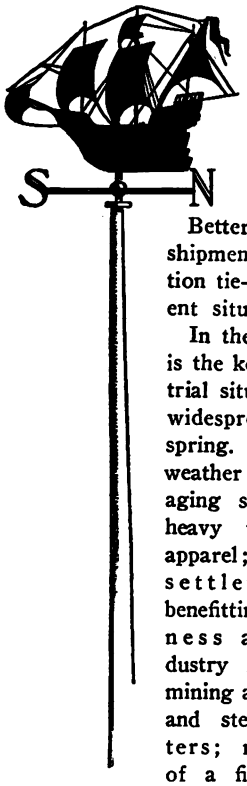


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Vol. 1
No. 24

THE
INDVSTRIAL DIGEST

Sept. 30
1922



The Business Weathervane

A Summary of Expert Opinion

Better business, higher prices, and increased shipments due to a desire to avoid a transportation tie-up, are the salient features of the present situation, according to leading economists.

In the opinion of **Bradstreet's**, "Improvement is the key word in the general trade and industrial situation, the use of this term being more widespread than at any time since early last spring. Cooler weather encouraging sales of heavy wearing apparel; strike settlements benefitting business and industry in coal mining and iron and steel centers; reaching of a final decision upon the tariff question, and activity in building, with all that this latter implies in the way of stimulating sales of lumber, brick, hardware, paints and allied lines, are all cited as causes for the better tone of jobbing trade advices, a gain at retail and a better pace in industry. A rally in grain prices by which wheat, corn and oats have been advanced to the highest levels of the month, this latter being mainly attributable to war talk, has been a slight additional stimulant."



(Chicago Tribune)

One by one the clouds roll by.

Dun's Review states that, "Although restriction of fuel supplies and drawbacks in transportation still hinder production and distribution, the restraints are gradually diminishing and records of both outputs and traffic movements are more favorable. That the volume of current trade is large in the aggregate is evidenced by various statistical barometers, and the reduction in the commercial mortality, as revealed by the insolvency returns, is significant of the stronger fundamental conditions. Foreign political events have influenced all speculative markets, but have had little effect in other channels, and there seems reason to expect, with labor difficulties largely settled, a continuance of the trend toward better business."

The United Business Service points out that "Prices, instead of continuing their declining tendencies, have definitely turned upward. Demand, which has been sluggish, is steadily increasing. Another fact, very worthy of careful consideration at this stage of the game, is that the jobber and retailer are characteristically prone to postpone building up stocks until the force of active demand is fully upon them. This merely means that the demand which is now held in abeyance will be more intensive when it is once released. Now is the time to get ready for this demand. . . The manufacturer who is willing to step in and build up a surplus of his product when raw materials and labor are comparatively cheap will have the greatest advantage in the period of business improvement which is now in store."

The Harvard Economic Service says, "The unfavorable conditions to which business was subject last month have now to a great extent been removed; the greatest obstacle still remaining is the unsatisfactory transportation situation, aggravated by the expected heavy burden which will be thrown on the railroads by increased coal production and by the normal fall expansion of the movement of other commodities. This is a retarding factor, but obviously not one which will lead to a reversal in the improvement now under way."

According to **Forbes Magazine**, "As to the future, there is good evidence that world conditions justify the expectation of a rising volume of sound business activity and prosperity for the United States, but halting business in several of the nations of Europe and unsatisfactory credit conditions in them serve warning against any expectation of a boom. Therefore, business expansion in the United States since the first of the year has perhaps been a bit too fast for the world, and the industrial and commercial slowing up caused by the strikes may not all be lost time, but may help keep America in step with the rest of the world."



The Fortnight

War's Clouds Again Threaten

THE international fire alarm has been ringing and European diplomatic fire engines are frantically endeavoring to keep the blaze at the Dardanelles under control. It is evident that the conflagration is a result of the failure to wholly extinguish the great fire of 1914-18, the smoldering ruins of which still constitute a menace to the rest of the world.

European nations are somewhat in the position of the taxpayers who are forced to support an antiquated pumping rig that never does much more than cool down the embers after the blaze is out.

And it is worthwhile to point out again that the entire matter is one of commercial rivalry. Instead of Germany opposing England's provincial expansion, we find France using Kemal as a tool to prevent commercial expansion of an ally that helped her to win the recent argument.

Greece for England and Turkey for France are simply the little boys of rival tradesmen, each of whom would prevent the other from doing business if he could, and seeks to accomplish this purpose without great danger to himself. The possible alliances which may come out of the present disturbance present some interesting points. If Germany takes sides at all (and sooner or later nearly every nation in Europe will *have* to take sides) her logical choice would be to stand on England's side as against France; but since Germany and Russia constitute even at present a near-alliance there would be presented the possibility of an Anglo-Russian alliance. Now, inasmuch as the Soviets are openly supporting Kemal in his present adventure, the tangle would seem to be too intricate for mere economists and business men to figure out. The rich oil lands that Russia controls will certainly play a part in shaping the events in the Near East within the next few months.

All this is apt to have a depressing effect on foreign securities—in fact the effect is already beginning to be discounted—and since it will not improve the already impoverished condition of Europe as a whole, it will hardly improve Europe as a possible market for our goods. In short, it is a bear factor and is being so considered by practically every economist in the country.

Business Outlook Not So Good

WHILE the immediate conditions seem to be favorable for a year or so of excellent business, fundamental factors are so shaping themselves that over a long period the outlook is not so bright. Europe is decaying rather than ripening. The tariff, while it should have, and probably will have, beneficial effect on business in this country for a year or so cannot but hurt it in the long run. There is practically no difference of opinion in this matter of the tariff so far as it affects our export trade. The main thing to keep in mind when discussing the tariff is that the position of the United States is entirely different from its position 5, 10 or 20 years ago. Today we are a creditor nation and our policies must be entirely different from those which we would follow were we still a debtor nation. Consequently the tariff is not a favorable factor—for any length of time.

Another point is that deflation has hardly been completed. This is particularly true in the case of labor. Certain labor unions have secured through rather forcible methods an advantage not over their employers but over their fellow-workers in other trades. Railway employees are notable examples. While the cost of living reached a level considerably below that of the 1918-19 peak, wages in many instances have not declined as rapidly.



(New York Tribune Syndicate)

Some big truck drivers have absolutely no manners.

Where labor has actually become more productive this is a deserved gain—but these gains are relatively few—in most trades where labor has not been deflated in proportion to the cost of living, further reductions will inevitably come.

It is perhaps in anticipation of this continued deflation that the Federal Attorney-General has forced to a conclusion his ill-advised injunction against the railroad strikers. While the judge who granted the injunction did so upon the grounds that the methods employed by the strikers were "in restraint of trade," as a plain matter of common sense the injunction violates the principles of free speech and lawful action. In consequence labor has been able to take the martyr's position and set up a howl which would never have been heard if the strike had been left to die a natural death.

For dead it is. Roads are running practically without interruption and so far as indications go most of the roads do not consider that there is a strike any longer.

in Perspective

Nevertheless, labor has been handed a weapon which it can wield with more or less success for the purpose of obtaining general sympathy. This would not seem important save for the fact that labor is apparently intent upon concerted political action and may even place a Presidential candidate in the field for 1924. The recent speech of Senator La Follette at the American Federation of Labor convention at Atlantic City indicates that he is being groomed for this candidacy.

THE coal problem is still with us. While bituminous stocks are in such a condition that industry can proceed without a great deal of difficulty, hard coal stocks for domestic consumption are much below normal, with apparently no chance of their being replenished in time for a full winter's supply. In the larger Eastern cities particularly, many homeowners will have to do with about one-half to one-third of their normal hard coal supply and the balance of their fuel will have to be wood, coke or, in some cases, soft coal.

It is apparent that the bituminous coal problem is entirely one of transportation. The productive output of the mines is not only able to care for the country's needs, but at the same time to rehabilitate stocks. The roads are able to handle current supplies fairly well, but, with crops moving, can do little more than that. In consequence, any shortage will be due to the inability of the railroads to handle more than current demands. This, of course, is going to operate for higher prices in many districts under the law of supply and demand.

The Chamber of Commerce of the United States in conjunction with the Federal fuel distributor has made the following suggestions for manufacturers who desire to cooperate to assist the roads in handling as much of the country's freight as possible: First, purchase coal under present conditions as closely to current needs as safety permits. Second, suspend accumulation of advanced stocks of coal until the present emergency pressure of production is relieved. This particularly applies to those who have low-price contracts and who are, therefore, under no price pressure to withhold immediate delivery. Third, unload coal cars immediately and return them to service (this, of course, with a freight tie-up imminent is not in any sense limited to coal cars—there will be a shortage of box cars as well, in any event, and 24-hour unloading is imperative). Fourth, promptly furnish material required for new railroad equipment or repairs.

This lack of sufficient rolling stock to handle fall freight will affect the building and construction industries most heavily.

More Proof of Our Basic Strength

THAT building construction in the United States during the first nine months of this year reached the unprecedented total of $3,000,000,000 was announced recently in the course of a nation-wide survey of the building situation. According to this report more Americans became home owners during the present year than in any previous year in our history. Expenditures for building, up to October 1, reached their peak in 1920—yet the 1922 record is more than $1,000,000,000 higher. About one-third of the total amount expended in building has been for home construction. That is a remarkable thing for the pessimist to consider. When a nation spends more than $1,000,000,000 a year for homes, many of which are privately owned, it is remarkable evidence of the underlying stability of our people.



(Brooklyn Daily Eagle)

Strike three — out!



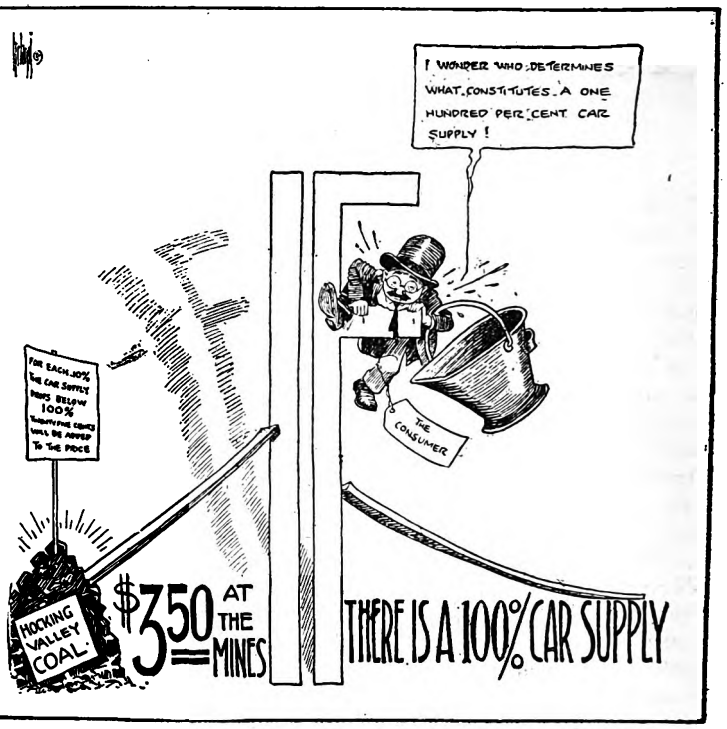
(New Orleans Times-Picayune)

Et tu, Brutus!



(New Orleans Times-Picayune)

Sit harder, Mr. Hoover.



(Columbus Dispatch)

A very big "if."

All Over But the Shouting!

And our attorney-general is trying his best to put a stop to that

ALTHOUGH the press of the country fully expected that the too-stringent terms of Attorney-General Daugherty's injunction, restraining the railway strikers, would be greatly toned down by the permanent injunction, if indeed such an injunction was obtained, these sanguine hopes have been destroyed. The permanent injunction which Federal Judge Wilkinson of Chicago has just handed down grants every request made by Attorney-General Daugherty and step by step nullifies every contention made by counsel opposing the injunction, thus, according to the *New York Times,* "giving life to one of the most drastic and sweeping injunctions ever issued by a Federal court."

That the injunction is intended primarily to prevent "restraint of trade" is made clear by an excerpt from the thirty-page opinion of Judge Wilkinson:

"In disposing of this motion it may be well at the outset to emphasize what this case is not. It is not a case between an employer and employes, or between persons employed and persons seeking employment, involving or growing out of a dispute concerning terms or conditions of employment. It is not a private bill to enjoin indirect injury, as one caused by a secondary boycott, to the property of the complainant. It is, to use the language of Circuit Court Judge Baker, speaking of the Court of Appeals, Seventh Circuit, in Cassaway vs. Borderland Coal Corporation, a bill in the public interest by the Government as parens patriae to enjoin an unlawful conspiracy or combination in restraint of trade. It is the conspiracy which is inflicting the public injury for which redress is sought.

. . . . . .

" The law is clear, in my opinion, that if the dominating primary purpose of the combination, is to restrain trade or to do things unlawful in themselves and which by reason of their inherent nature operate to restrain trade, the purpose of the combination is unlawful, and that purpose may not be carried out even by the means that otherwise would be legal."

The roads, during all this excitement, are maintaining a policy of strict silence as regards the injunction and are proceeding with the business of handling traffic without a great deal of interruption from the men still on strike.

The Eastern roads are running with practically full crews and although some of the Southern roads are still having a little difficulty, to all intents and purposes the strike is ended. And in view of this, many editors are asking themselves, "What's all the shooting for?"

The injunction thus far has served no other purpose than to cause numerous radical outbursts by labor leaders and sympathizers who under most circumstances would have kept perfectly quiet. The strike was settled by the rail executives, and even though individual agreements may be made between specific executives, and even though individual agreements may be made between specific roads and their own men, this does not alter the fact that neither the Government's interference nor the now famous injunction had absolutely "nothing to do with the case, tra-la."

Among other things the injunction has served to discredit the Railway Labor Board. In fact this has gone so far that it is reliably reported in several newspapers that Secretary Hoover has been approaching the question of a compulsory arbitration bureau coincident with the abolishment of the Railway Labor Board.

To date only one editor has been held in contempt of court for violating the injunction, but if Daugherty's methods are approved it will only be a short time before every newspaper in the country will have to carry a lawyer on its staff to go over its editorial sections and cull out any phases which might offend the sensitive ear of our injunction-makers.

Canute tried to stop the ebb and flow of the tides without much success, and it is not likely that our Attorney-General will have any better luck in stopping the strike-talk and strike-print which the injunction forbids.

How the European Situation Will Affect Business

EVER since the newspaper headlines began to exhibit the aspect which was so familiar during the summer of 1914, business men have been asking two questions: First, Will there be another great war?; second, How will European conditions affect my business?

The consensus of opinion seems to be that there is no likelihood of another general conflagration immediately. True, in two fundamental respects the situation is quite similar to that prevailing prior to the outbreak of the World War. The smaller nations of the Near East still retain little bitter hatreds toward each other—hatreds which for the most part were fostered by the larger nations of Western Europe. These more powerful nations are, as before, lined up on opposite sides—though the alignment is not the same.

Nevertheless, there are two very real reasons which editorial observers feel may have the effect of averting another catastrophe. The first is the precarious financial condition of practically every country in Europe. England alone is in a thoroughly sound position in this respect. Yet even England can hardly afford to spend the sums which another major war would entail. Second, there is not much to be gained from a war right now, save prestige, power, and other items which do not have an immediate money value. So far as trade is concerned, purchasing countries and exploitable provinces are too busy recuperating from four years of disastrous expenditures for their markets to prove much of a prize. And behind and above that lies the fact that Europe as a whole has had a very bitter education as to what real war actually means in casualties, in grinding effort and in money and property loss.

As the *Brookmire Economic Service* puts it, "Every time the European diplomats get into a wrangle, which under old conditions would have been sufficient cause for war, and in spite of that tangle, readjust through compromise, *by just so much more* (italics ours) do we have proof that no set of political officeholders dares to attempt to lead these populations into war for any other purpose than the preservation of national existence itself."

But even if there is a minor war in Eastern Europe, conditions will still have an effect upon business. First, it will have an unfavorable effect, generally speaking, on foreign securities. Second, the situation may result in a realignment of forces, bringing Germany and England together on the same side, a condition which would certainly force France to a reconsideration of the reparations and consequently make for immediately improved conditions for Germany and the betterment of the mark's exchange value.

So far as mobilization of troops would remove men from industry it would decrease their production of goods and would by that much increase our market for exports.

Should actual war between Turkey and England result, it would probably mean the offering in this country of additional British securities for sale.

Oil men are asking themselves whether it is anything more than a coincidence that England is placing so much emphasis on the control of the Dardenelles as an outlet to the oil wells in the Baku region. Oil has always played a prominent part in determining England's foreign policies; may it be that once more it is partially responsible for setting Europe on fire?



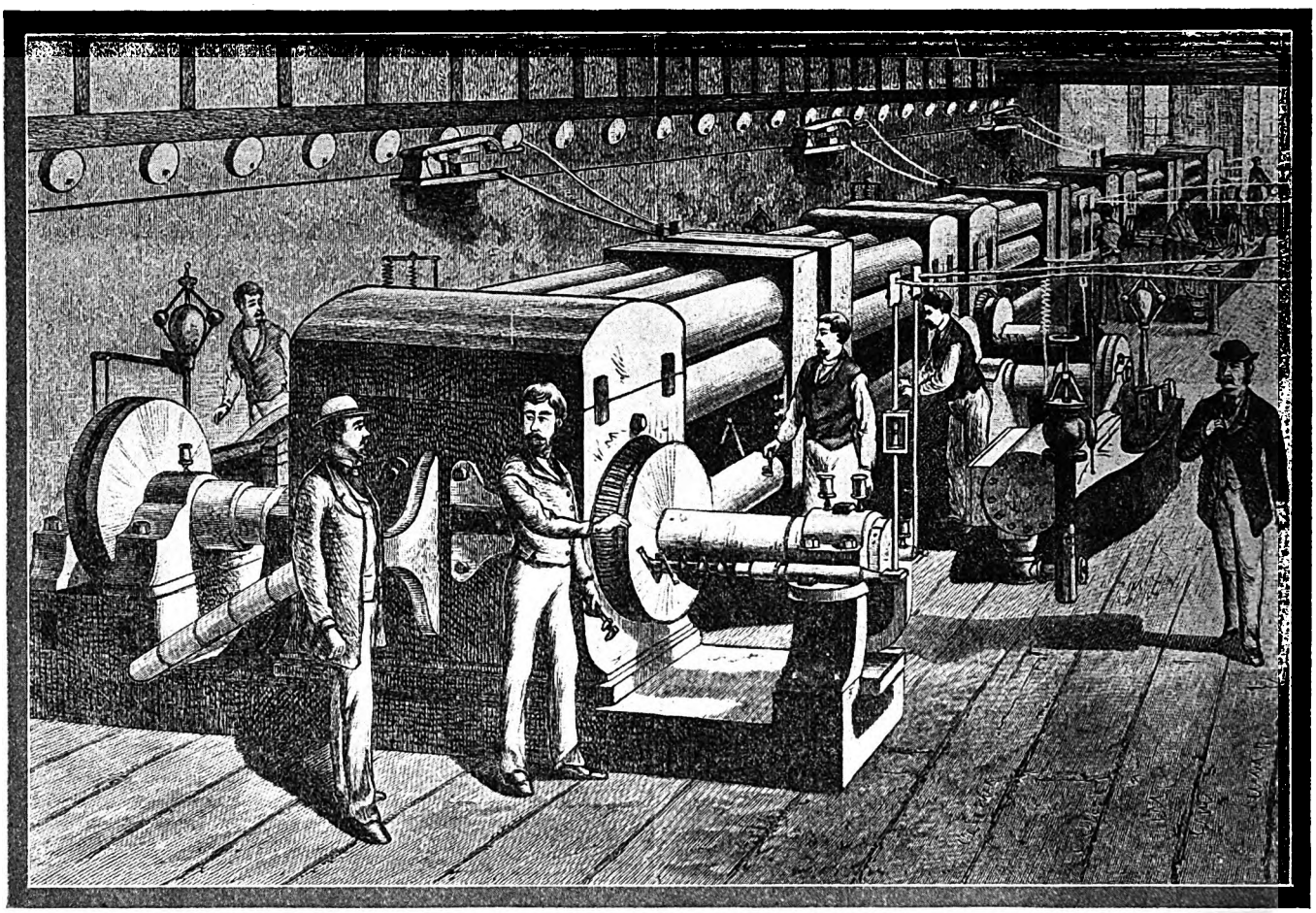
(Brooklyn Daily Eagle)

So near, but yet so far.



(St. Louis Globe-Democrat)

One means for raising the bonus.



Interior of New York's first central station in 1832. The equipment consisted of six jumbo generators, each of 125 h.p.—*(The Scientific American, courtesy N. Y. Edison Co.)*

Electricity—the Genii of Our Lamp of Progress

What forty years of electrical development has meant to the industrial world—what changes may be expected in years to come?

THINGS that have been happening recently remind us of newness of the environment we live and work in. The death of Alexander Graham Bell brought to mind the fact that the telephone—the little instrument that jingles on the desk all day—was invented little more than a generation ago. Then came a further reminder—the 40th anniversary of the establishment by Thomas A. Edison of the first electrical central station in the world.

Astounding changes have taken place in the past 40 years. A man of 40 has passed through only the preliminary stages of his life, and is just about to enter its most fruitful period; yet the electric light, the generator, the motor and most of the other commonplace industrial devices of today are no older than he.

Forty years ago the first electric light bulb, illuminated by a current which had been generated in a dynamo and carried through the street by a feeder wire, blazed up in a building in lower New York. The entire apparatus involved was totally new. When the idea of a central station to supply light to an entire district occurred to Mr. Edison he found it necessary, in order to carry the idea into effect, to invent not only the incandescent bulb, but the dynamos that generated the current and the system of feeders that carried it to the bulbs.

The technique of applying electricity to industrial uses has developed so tremendously since that time that it is impracticable even to catalogue the improvements. Telegraphy was virtually the only important application of electricity that in 1882 had reached anything closely resembling its present form. Even that has undergone technical improvements in the past 40 years. Automatic receiving and sending devices have been perfected, relays have been devised to facilitate long-distance transmission of signals, systems of multiplex telegraphy have been invented that greatly reduce the cost of sending messages, and sensitive receiving machines have been constructed that make the operation of trans-oceanic cables efficient and accurate. The telephone, which was in a rudimentary stage when Edison opened his first central station,

has been brought to a point of development which could not have been predicted in those days. The latest great development in this field is the automatic switchboard, which practically eliminates the need of "hello" girls. The New York Telephone Co., in co-operation with the Western Electric Co., is now engaged in the gigantic task of installing these machine switchboards which may eventually serve the 1,044,000 users in New York City.

The art of converting mechanical energy into electrical energy, transmitting it through wires, and reconverting it to mechanical power to drive machines, has taken enormous strides. The use of electrical power in industry was unknown then; electricity is now one of the chief methods of supplying industrial power, and the further development and application of this technique is one of the chief problems of our future industrial development. It is a long step from Edison's first central station to the super-power plan to supply the entire North Atlantic seaboard from one great transmission line; yet that is the stride which has been taken in 40 years.

The devices for the use of electricity in the home and the factory for other purposes than the production of power and light and the transmission of messages are myriad. The electric furnace—to mention only one of them—has made possible the attainment of unbelievably high temperatures. One other paramount development must be mentioned—radio.

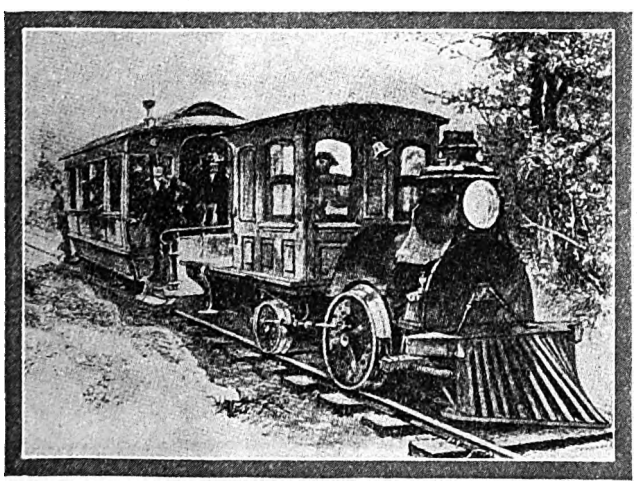
The transmission of telegraphic signals and human speech through the ether is a source of perpetual wonder. The radio has been responsible for the mushroom growth of a branch of the electrical industry in the United States that has attracted as high as $5,000,000 of new capital in a single week.

Our First Central Station

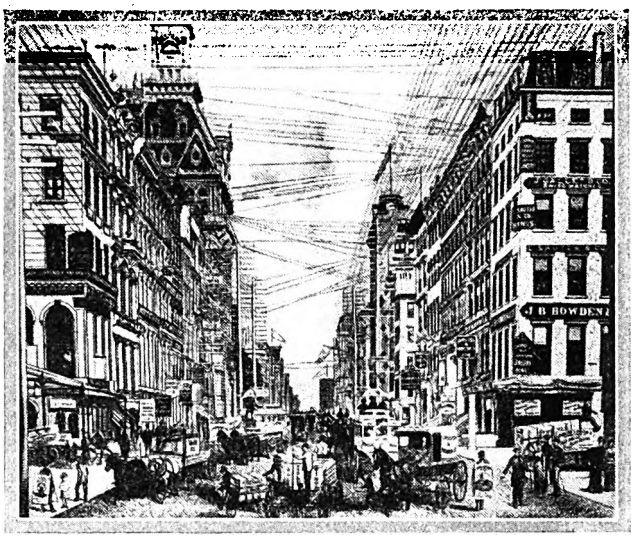
THE biggest problem before electrical engineers today, from the industrial viewpoint, is the problem of the supply of power through central stations. They are thinking of lines for the transmission of power at high pressure for the supply of extensive districts, and of water and steam power stations feeding those lines. The future power needs of industry will be supplied by these means, they think.

All this is a direct outgrowth of the central station which was opened at three o'clock in the afternoon of September 4, 1882, at 257 Pearl street, New York City, by the Edison Electric Illuminating Co. The story of the first central station is told in the *Bulletin* of the National Electric Light Association as follows:

"The Pearl street station was a double brick building, four stories high, of the warehouse type, its two parts being separated by a fire wall. One part was used as the station, the other as a storehouse. To stand the strain of machinery considerable remodeling had been necessary. In May, 1881, steam boilers were installed in the basement and six generators on the second floor.



The forerunner of the present electric locomotive—an experimental train operated at Edison's home in New Jersey.—*(New York Edison Co.)*



Broadway in the early eighties. There was nothing "underground" about life in those days—note the maze of overhead wires centering at the Western Union Telegraph Building north of Cortlandt Street. The overhead congestion soon became so great as to necessitate underground laying.—*(New York Edison Co.)*

"These six generators, each with a capacity of 125 horsepower, were popularly known as "Jumbos." One of these "Jumbos" is still in existence, having been preserved by the company for historical purposes. When Thomas A. Edison gave the signal that afternoon 40 years ago, these generators sent forth current along underground lines for a total length of 13 miles.

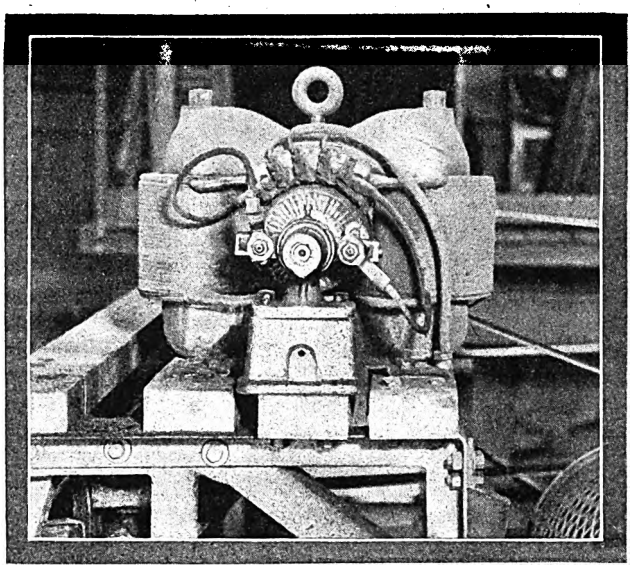
"There had been plenty of toil and difficulty before that triumphal turning on of electricity. There had been years of experiment and preparation. Edison's plans, as laid out in 1878, included perfection of the lamp, a distributing system commercially practical, underground conductors which could be tapped to supply customers, devices for lamps to give even and equal supply of light, regardless of distance from the central station, a meter to measure current, designs for an adequate dynamo, and safety appliances.

"The greatest obstacle to operation was an underground system. Many experts believed current could not be conveyed underground without great loss through leakage. Edison, however, insisted on underground transmission. The streets of New York were already overburdened with wires—telephone, telegraph, burglar-alarm, fire-alarm, and stock-ticker. Today all these wires have been taken underground.

"The manufacture of lamps was commenced at Menlo Park (New Jersey), in November, 1880. Prior to that date, a large number of lamps had been made, but the first regular pay roll of the lamp company, as an organization distinct from the laboratory and the experimental department of the light company, was November 11, 1880, which may be taken as the date of the starting of the factory. From that time until April 1, 1882, when moving to Newark was commenced, the factory was running all the time, except about six weeks. The largest number of men employed at any one time was 135. Up to April 1, 1882, 80,000 lamps were shipped, and at that time there were about 50,000 unsold in stock. The manufacturing of lamps was begun in the new factory at East Newark on the first of June, 1882, with 150 men employed. The tools and power in the factory were adequate for making 1200 lamps a day, but the factory had an ultimate capacity of 40,000 lamps a day."

The newspapers of the day devoted much space to the description of the electric light. Morning newspaper workers, who were accustomed to toiling all night under gas jets, were especially appreciative of Mr. Edison's enterprise. The *New York Times* said on the morning after the opening of the plant:

"It seemed almost like writing by daylight to have a light without a particle of flicker and with scarcely any heat to make the head ache. The lights in the *Times* Building were tested by men who have battered their eyes sufficiently by



After a half century of service this motor is still in use, revolving faithfully for the New York Edison Co. in its original home in the 41st Street shop. It is the oldest motor at work in America.

years of night work to know the good and bad points of a lamp and the decision was unanimously in favor of the Edison electric lamp as against gas.

"The whole lamp looks so much like a gas burner surmounted by a shade that nine people out of ten would not have known the rooms were lighted by electricity except that the light was more brilliant than gas and a hundred times steadier. To turn on the light nothing is required but to turn the thumbscrew; no matches are needed, no patent appliances. As soon as it is dark enough to need artificial light, you turn the thumb-screw and the light is there; no nauseous smell, no flicker, no glare."

The *New York Tribune* told of "each lamp shedding its light from a small blazing horseshoe that glowed within a pear-shaped globe, pendant beneath a porcelain shade." The *New York Herald* said that the "dim flicker of gas" had been "supplanted by a steady glare, bright and mellow." It stated conservatively that "Last night it was fairly demonstrated that the Edison light had a very fair degree of success." It described how "Mr. Edison stood in the workshop at 257 Pearl street, in his shirt-sleeves, superintending the work. Mr. Edison said that care would be taken to watch all influences that would offset the light, and doubtless new information tending to make it even more perfect would be gleaned."

"Mr. Edison was seen by a reporter," said the *New York Sun*. "He wore a white, high-crowned derby hat and a collarless shirt. 'I have accomplished all I promised,' he said. 'We have a greater demand for light than we can supply at present owing to insufficiency of men to put down the wires. We have to educate the men to the use and management of our machinery. We have only one experienced engineer here now. A man came down from our machine shop in Goerck street the other day and put his oil can between two conductors. He was a badly frightened man a second later, for the can melted away as quickly as the oil it contained. Another workman, while employed at a wire in Fulton street, used a screwdriver. He was surprised to see his screwdriver burn away, and returned to the station in great haste to know what was the matter."

Compared with present-day power plants, the Pearl street station was crude. Edison's Jumbo dynamos served their purpose satisfactorily, but they had their limitations. Improvements came fast, however, and according to Fleming,

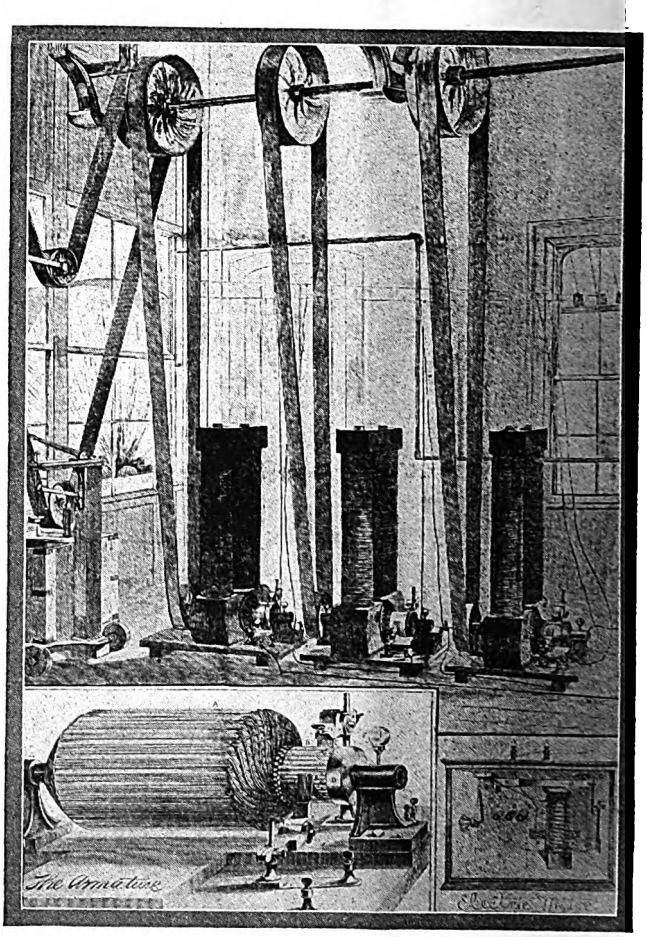
"In the ten years between 1880 and 1890 the dynamo was thus perfected so that from being a machine very liable to breakdown and failure, especially in electrical insulation, and of low efficiency, perhaps not more than 60%, it was raised to the condition of being a highly efficient energy-transformer of 90% to 95% efficiency, capable of sustaining long non-stop runs without overheating or failures mechanical and electrical."

The invention of the steam turbine marked an important step in the development of efficient electrical power stations. Edison's early dynamos were run by direct-coupled reciprocating steam engines. In 1885 Sir Charles Parsons took out his first patents on a steam turbine, and in the same year George Westinghouse took out a license in the United States for the manufacture of Parson's turbines in this country, believing that this form of prime mover was especially suited for the operation of electric generators. In 1899 turbo-generators of 400 kilowatt capacity were installed at the plant of the Westinghouse Air Brake Co. at Wilmerding, Pa. According to an announcement of the Westinghouse Company, "these units are still in good operating condition and are held as standbys for night loads."

The Development of A. C.

THE next great step in the development of electrical power distribution was the perfection of devices for use with alternating current. The great advantage of alternating current is that it can easily be raised or lowered in voltage. Today alternating current is used in many long-distance power lines, such as those employed by electric railways, in this way—the current is generated in a central station by powerful alternators at a high voltage, and is transmitted by feeder wires to sub-stations, where the voltage is reduced by transformers and the A. C. is turned into D. C. in converters, or "motor-generator sets." In the case of electric railways, the low pressure D. C. is then carried in trolley wires or third rails to the cars and locomotives.

So the technique of the transmission of power has improved, and with it numberless other applications have improved. Perhaps the strangest thing about this varied growth of the elec-



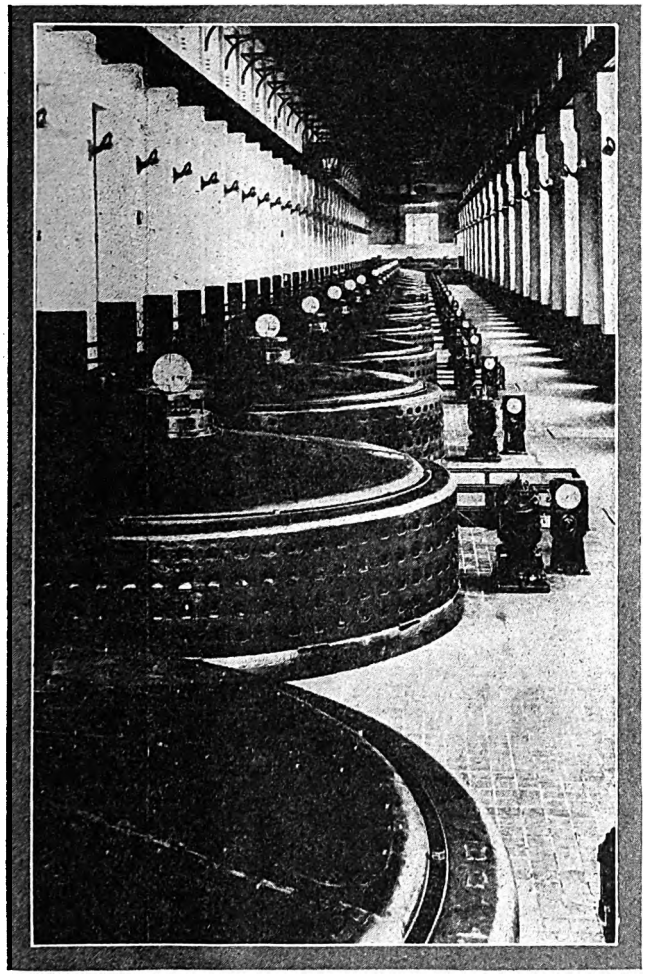
Diagrammatic view of the first Edison electric light generators installed in New York. This view contrasted sharply with the modern generator room shown on the opposite page.— *(New York Edison Co.)*

trical science is that almost all of it is dependent upon a physical phenomenon supplementary to that of the electric current itself. One would be inclined to think, at first, that a current "flowing" through a wire is the only basic phenomenon upon which this technic is based. But the electric motor, the wireless telephone and their fellows could not exist without something else beside electricity. That something else is magnetism. The magnet and the properties which it possesses are as essential to the existence of the wonders that are about us as in the electric current itself.

J. A. Fleming, the British pioneer electrical engineer, known to students of elementary physics as the inventor of Fleming's hand rule, which makes it easy to remember the motor-generator principle, and to radio engineers as the inventor of a thermionic valve or "vacuum tube," explains this in his book, "Fifty Years of Electricity":

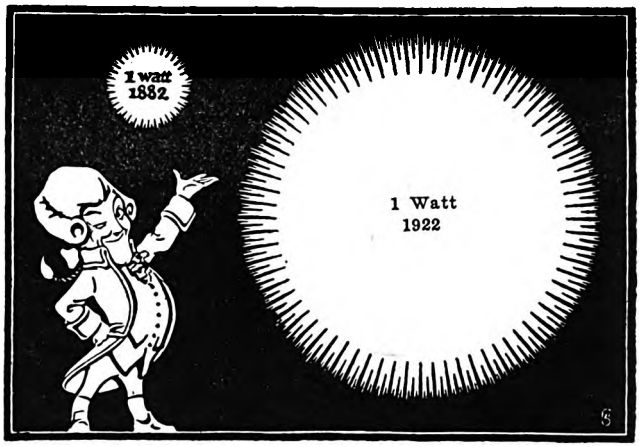
"Our age is essentially an age of iron and steel. One of the unique properties of the metal iron is that it can be magnetized. This power is exhibited, but to a much less degree, by two other metals, viz., nickel and cobalt. Take an iron bar, say a poker, and wind round it spiral coils of copper wire, this wire being spun over with silk or cotton to insulate the turns. Connect the ends of this wire to a battery or source of electric current and the iron instantly becomes a powerful magnet. It will attract and hold up other pieces of iron and exhibits many remarkable properties as long as the electric current flows around it. Such an arrangement is called an electromagnet.

"The work of the electrical engineer for the last 50 years has been largely concerned with the development and utilization of the electromagnet, and this again has been based upon the scientific study of this peculiar property of iron by numerous investigators. The best method of testing the value of a possession to us is to imagine our condition if we lost it.



(© Galloway)

Contrasted with the first electric generating plant (shown on page 1606) is this view of the world's most powerful set of generators—the hydraulic power generators at Keokuk.



Relative costs of lighting in 1882 and 1922. In 1882 the rate was 22 cents a kilowatt hour, and the lamp consumed 4.6 watts per candlepower. Today the highest rate is 7 cents and the lamps use 1 watt per candle.

"Let us then suppose that by some freak of nature this much used metal iron suddenly lost it capability of being magnetized without sustaining any other changes in physical properties. If that event had taken place 100 years ago it would have been serious because it would have deprived mariners of the magnetic compass and thrown back the art of navigation to the condition in which it was some centuries previously. But if it happened today it would completely paralyze our modern life.

"Electric trains and trams would cease to run, because all dynamos which generate the electric current that moves them would have become inert and useless. Electric lighting would vanish, and large towns would be left in darkness. Factories would come to a standstill because electric motors would have ceased to function. Telegraphs and telephones, electric bells and railway signals would be absolutely inoperative. All motor vehices would be immovable because the magneto ignition or spark coil involves a magnet or electromagnet. Mechanical transport would therefore be impossible, and even main line steam railways could hardly work because the signaling arrangements on which they depend are essentially electromagnetic. No general strike on the very largest scale would more completely inhibit all commercial activity. In a month all large cities would be in a state of starvation and the traffic and movement on which our commercial life depends would be destroyed."

Electricity's Myriad Uses

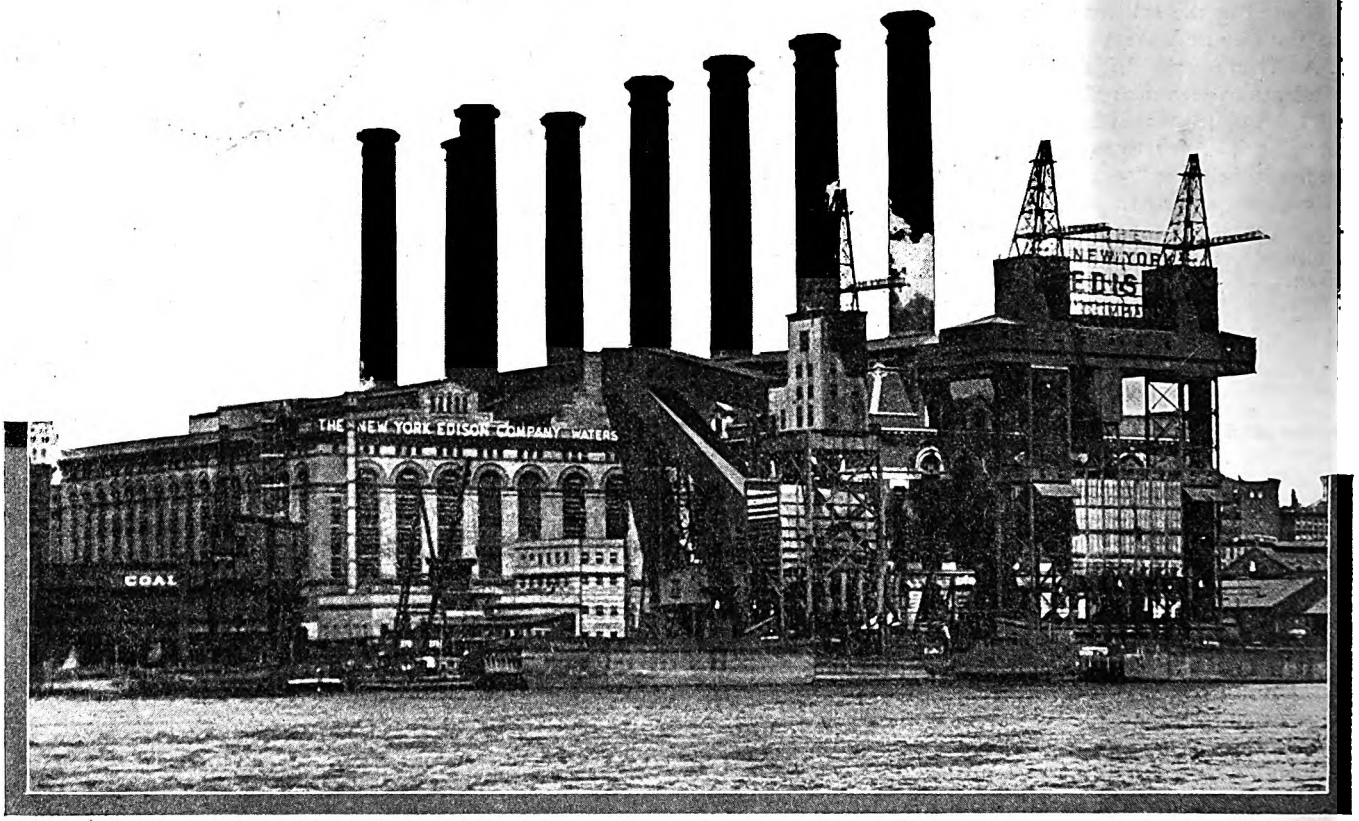
THE industry which has grown up since 1882 enters into every part of our home and industrial life. It runs our machines, lights our homes, carries our messages, and amuses us. But it is still young. No one could have predicted 40 years ago how vast would be the application of electricity today; no one can predict the situation 40 years in the future. One thing only can be said with certainty—we have seen only the beginnings of electrical development. The use of electricity will grow, perhaps, to a more vast extent than we can now imagine. The *Electrical World* asks editorially:

"What will another 40 years bring? Will 1962 show no further advance over 1922 than 1882 showed over 1842? Is electrical development approaching its zenith, and will it display henceforth only a slow rate of growth and be applied in few new ways, if any?

"No man imbued with the spirit of the electrical industry will believe so. We shall not indulge in specific prophecy. It would be rash to predict that some new discoverer is going to find a way to convert electrical energy into heat at a cost which will make the householder forever independent of mine owners and mine workers. It might not be safe even to aver that before 1962 steam will surrender its last independent fortress, already besieged, and transportation by rail be universally electrified. But if these things do not come, others will. In the approaching days, when unwired buildings will be things of the past, humanity will be aided in ever-increasing degree by the youngest and greatest of its invisible servants. No other result is possible from the research, the enterprise and the industry of those to whom electricity is more than a business, an art or even a science—to whom, indeed, it is hardly too much to say it has become a religion."

Electricity and the Manufacturer

A record of the industrial improvements during the past year from the production executive's viewpoint



The New York Edison Company waterside plant on the East River, New York. Improved methods of coal handling and highly developed electrical and mechanical equipment help make this efficient plant which supplies New York with light and power.

ELECTRICITY today is indispensable to industry. Every other day, it seems—or at least every other week, to be conservative—some new application of electricity to factory work is devised, or some old application is improved. Factories are constantly turning to electricity for the solution of their problems.

The completeness with which it is possible to equip a factory with electrical devices is illustrated by the example of a sugar refinery on the Pacific Coast, whose electrical system was described in the *Journal of Electricity and Western Industry*. This plant requires steam for use in the process of sugar refining. The company's electrical engineers considered that it would be economical to operate a steam turbine generating plant, and use the exhaust steam for manufacturing processes. Thus the electrical current generated would be a by-product which could be used to great advantage.

With this by-product the sugar refinery runs 700 electric motors, producing a total of 10,000 horse-power. The motors vary in size from 1 to 350 horse-power. With their aid the refinery moves 2000 tons of sugar a day. In addition the plant operates several 1000 horse-power synchronous motors, to run centrifugal pumps and compressors.

In addition to supplying this power, the by-product electricity operates a system of loud horns used for calling employes from one part of the plant to another, an automatic fire alarm, an automatic time whistle, an electrical device for the counting of sugar sacks, a set of electric heaters to dry boxes, an electric oven used to dry motor windings, a set of electrical testing equipment, and electrical controls for syrup gates and valves. It also heats and lights the plant, and runs an electric welding outfit.

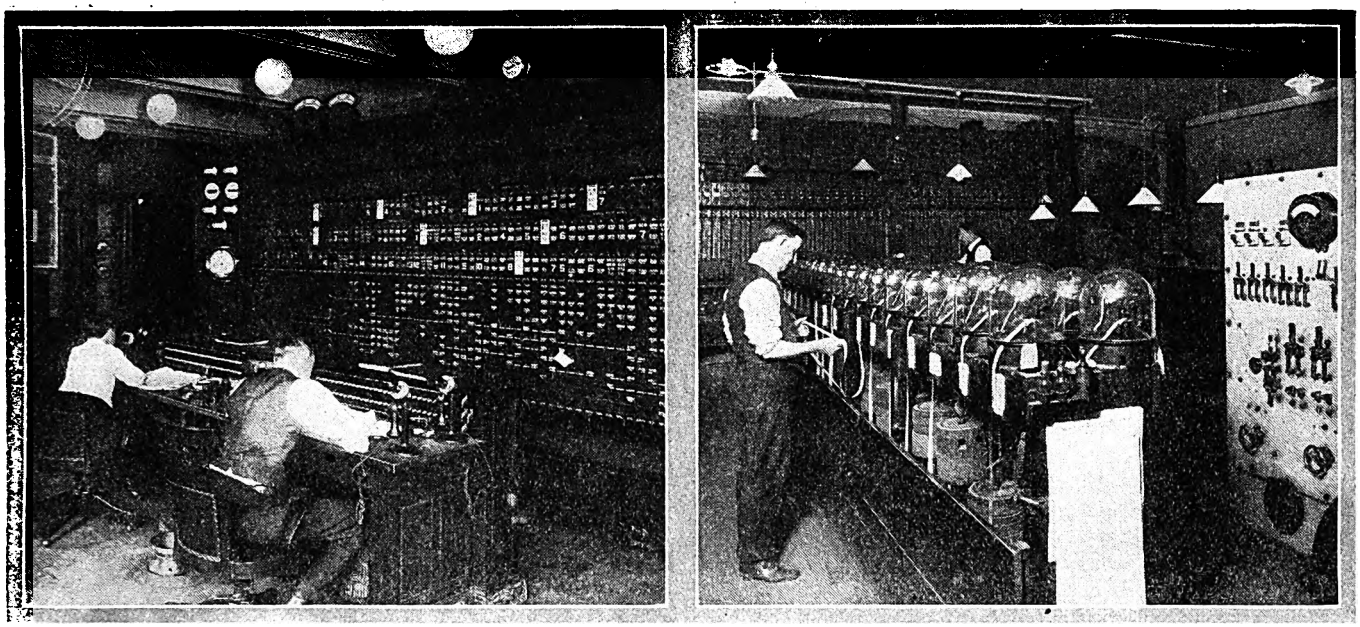
This factory is not described because it is anything unusual, but because it shows the diversity of the ways in which a single plant can use electricity. There must be thousands of other factories which are just as well equipped electrically.

The electrical equipment manufacturers turn out a great number of new devices for the use of industry every year. Indeed, one of the great difficulties with which the industry has to contend is the multiplicity of new devices which are invented. Improvements come so fast that each spoils the market for the next. Factory owners are reluctant to buy newly developed equipment when the equipment which it is to replace is still new. For this reason many of the large equipment manufacturers pursue a policy of withholding new inventions from the market until they think their customers are ready to absorb them.

In spite of this policy, new devices are coming thick and fast. The Electrical Apparatus Committee of the National Electric Light Association, in its report to the convention of the association at Atlantic City, presented the following description of some of the new developments in industrial apparatus during the past year:

Textiles

"In the textile industry, where individual motor drive is rapidly replacing group drive, several interesting developments have been made during the past year, among which may be noted the following:



Views from the Stock Quotation Co. offices in New York. The entire system calls for the finest possible co-ordination between human accuracy and electrical speed.—*(New York Edison Co.)*

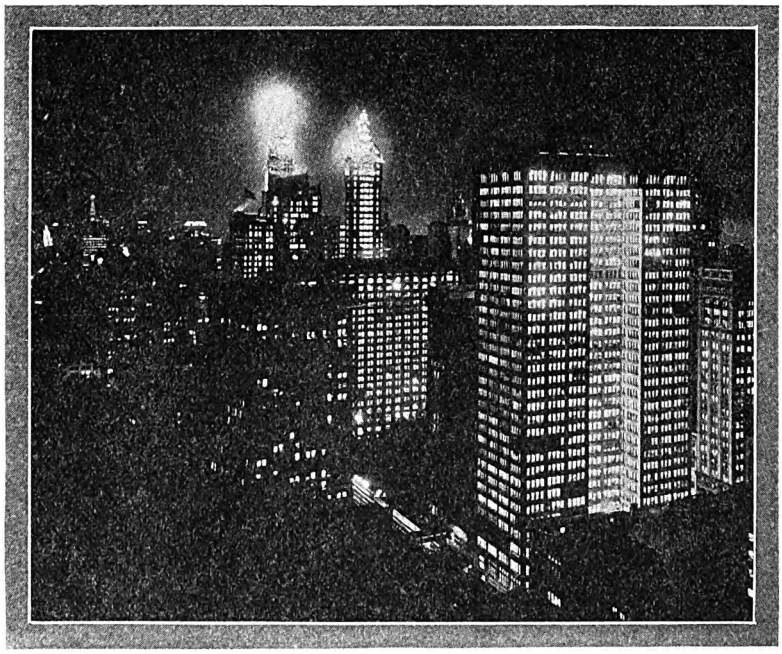
"A new type of motor safety starter, comprising a quick break switch with thermal cutouts. This is especially adapted for starting loom motors, as it permits heavy starting currents and short time peaks above full load without interrupting service. The thermal cutouts used are of a suitable capacity to protect a given motor and at the same time allow maximum production by using the thermal capacity of the motor.

"A three-motor method of driving silk spinning frames. The motors drive direct to the spindle belts, the motor on the upper deck having a flywheel which carries over after current has been cut off, thereby preventing snarling of yarn from the lower decks.

"The application of a direct connected variable speed motor to spinning and twisting frames is a great advantage, as a wide range of speed is obtained by simply operating a rheostat.

"The use of individual stripper motors has obviated the difficulty formerly experienced in applying motor drive to revolving flat cotton cards. Where individual stripper motors are used only one motor is necessary for the entire card room.

"The tandem method of drive for tenters is very interesting. Two, three or four motors are used, according to the number of machines in the set. (Set includes starch mangle, dry cans, tentering frames and occasionally an additional set of dry cans.) Variable speed motors are used with one master control for all and auxiliary controls for individual motors. Compensator rolls, placed between the different machines and actuated by the cloth running through the tenter, automatically adjust the speeds of the individual motors by varying the amount of resistance in the motor circuits, depending upon the speed of the cloth between sections.



One of man's greatest triumphs—the utilization of electric power—is attested by this picture. This view of downtown New York at night offers little evidence that man once feared night.

Steel

"One of the most noteworthy events in this field was the replacement of a twin tandem reversing engine, which drove the first finishing stand of the Lackawanna Rail Mill, by a reversing motor equipment. This is the first main roll electric reversing drive sold in this country to replace an engine.

"The motor unit has the highest continuous horse-power capacity (8000 hp.—50° Cent.) of any electric reversing drive in the world. It was designed to roll the first four of the last five passes on a 105-lb. rail section at the rate of 240 gross tons per hour, the last pass being made in an adjacent mill driver by a separate engine. Although the equipment has not been fully loaded as yet, the mill has rolled at the rate of 198 gross tons per hour of 105-lb. rail, which exceeds all previous tonnage records on this mill. A particularly interesting feature is that this rate of rolling was made with the last finishing stand disconnected from its engine and connected to the first finishing stand, so that the motor was driving both stands and rolling five instead of four passes.

"The noticeable activity in sheet and tin mills during 1920 resulted in orders for a number of motor drives, and during the present year several of these equipments have been placed in operation. The electrical equipment for the Tata Iron & Steel Company's 45-in. revers-

ing blooming mill is now being installed in Jamshedpur, India.

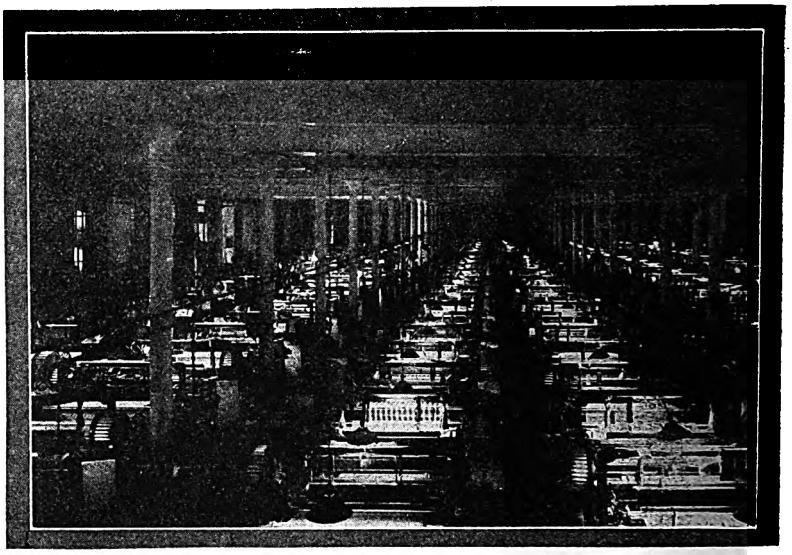
"A very important development in magnetic control equipment has been perfected and put on the market. This consists of a new design of contactor which makes it possible to obtain a steel mill controller with contacts and arc-chutes having a life from 15 to 20 times greater than formerly. The new contactor differs radically from the older type in that all parts, as far as possible, are made of pressed steel or punchings, which are light in weight and very uniform, instead of castings which are heavier and require considerable machining. The result is a quicker operating switch of greater reliability. These contactors are used in a standardized line of magnetic controllers utilizing the voltage drop relay scheme of current limit acceleration.

"The voltage drop accelerating system has many advantages in that it provides a combination of current limit and time element that allows the current setting to be high enough to provide torque for the heaviest loads and yet when the load is light and requires less starting torque, the time element will reduce the current and torque speeds to lower value. This prevents unnecessary punishment of motor and machinery during the light load period. The time element is obtained by purely electrical and magnetic means, no dashpots or other mechanical devices being used.

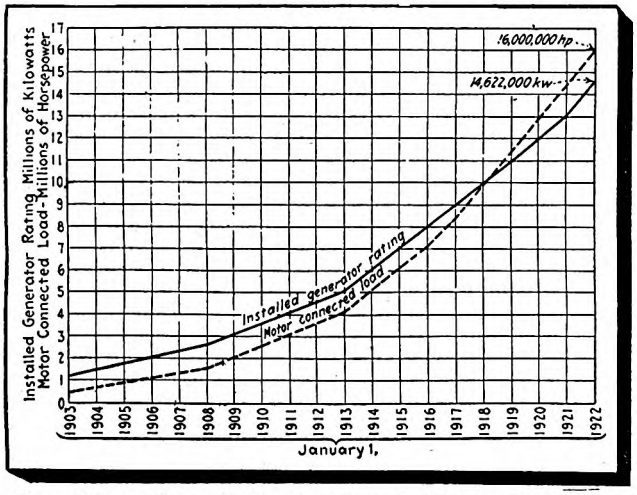
"The torque and current peak during acceleration are, therefore, more nearly a function of the load than with other systems of acceleration. This feature is particularly desirable for applications requiring variable starting torque, such as steel mill auxiliaries.

"The two largest electric furnaces in the world, for the melting and refining of steel, were put into operation the early part of 1921.

"Each furnace is normally rated at 40 tons holding capacity, each charge being handled separately so as to keep the metal as clean as possible. One of the furnaces is fitted with 24-in. carbon electrodes and the other with 14-in. graphite electrodes, thus giving current densities of 46.8 and 137.5 amperes per square inch respectively with the transformer at its maximum output of 21,200 amperes per phase. On the basis of 2500 kv-a., giving 13,130 amperes per phase, the heat generated in a 100 in. length of electrode is respectively 21.6 kw. and 28.3 kw., amounting to 1% and 1⅓% of the total input respectively on the basis of 85% power-factor—a small amount, but contributing to the total useful heat in the furnace. The equipment for each furnace consists of a transformer, switch and instrument panel, electrode regulator panel, operator's panel, three electrode motors, and a tilting motor.



A "before" picture of factory illumination showing the direct system, costly in money and in low productivity of eye-strained workers.



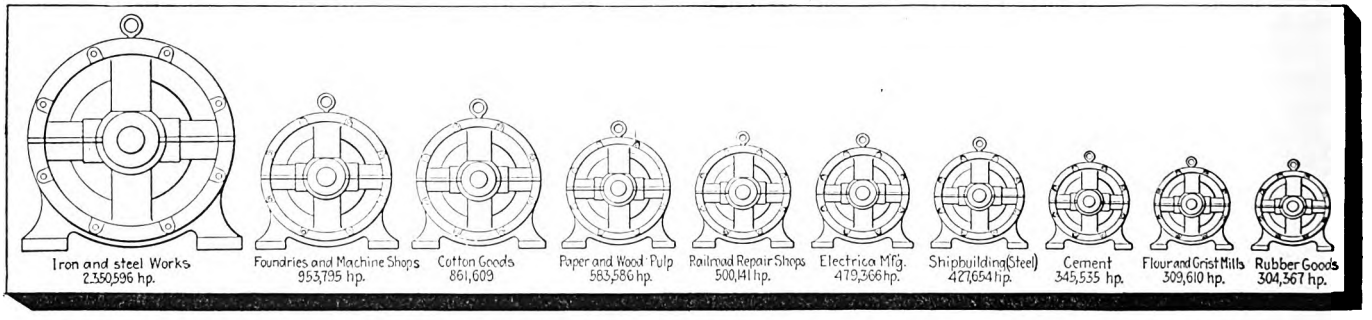
Growth in total installed generator rating has averaged about 10% per year.—*(Electrical World.)*

"Each transformer is of the three-phase water-cooled oil-insulated type, supplying 17,300 amperes per phase, with 110 volts between phases, or a total of 3300 kv-a., the high-voltage winding being designed for operation from a 6600-volt, three-phase circuit. Taps are provided in the high voltage windings so that full input can be obtained at 100 or 90 volts as desired, the last connection giving 21,200 amperes per phase.

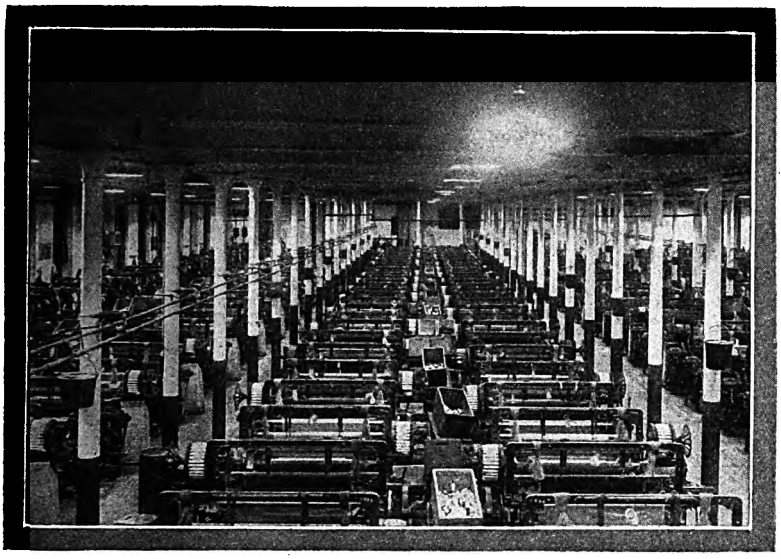
"The electrode motors, whose important duty it is to control the movement of the electrodes in response to the action of the electrode regulator, are designed to deliver 5 hp. at 1150 r.p.m. when taking power from a 230-volt direct current circuit. They are totally enclosed and provided with self-lubricating bearings.

Paper

"One of the late developments in sectional drive and control for paper machines is a simplification of former practice, in the



The "big ten" in the field of electrified industries. The number of motors and total h.p. rating were almost doubled in U. S. manufacturing plants between 1914 and 1919—*(Electrical World)*.



The "after" picture shows the same factory on opposite page under new indirect lights. The bill for current actually became smaller.

elimination of all relays and rheostats from the speed-regulating system.

"The d.c. section driving motors, of standard type and design, are made to function much like synchronous motors in so far as speed regulation is concerned; that is, they will operate in parallel indefinitely without change in the relative number of revolutions per minute.

"For changes in load or change in temperature a small relative change in the angular position of motor armatures, of a few degrees, may take place, as in the case of synchronous motors, but motors will run indefinitely without loss or gain in their relative speeds in revolutions per minute.

"This speed regulation is obtained by the use of rotary contactors designed as section mono-rotary contactors and master rotary contactor. The section mono-rotary contactors are driven by the d.c. motors driving the paper machine sections through a small speed changer, and the master rotary contactor is driven by a small direct current Pilot motor, operating in parallel with the main motors.

Oil

"During the year, considerable progress has been made in the development of suitable motor drive for oil well drilling. Trials of various arrangements have been carried on during the past two years. . . .

"One arrangement makes use of a cut spur gear drive from the 600 r.p.m. or 720 r.p.m. induction motor to a short countershaft, and chain drive from the latter to the draw-works spindle of the rotary rig, using standard "rotary" chain. The bearing supporting the gear and pinion are mounted on a structural steel foundation, on the bottom of which is riveted a heavy steel plate web on which the motor is mounted, the latter being connected to the pinion shaft by a flexible coupling. The entire structure is supported on heavy timbers buried in the ground, as it has been found by experience that concrete foundations are too rigid and will usually shatter under the heavy whipping action of the drilling stem when striking or passing boulders.

"Generally 75 hp. is ample in capacity, but if the driller plans to operate the drilling bit at higher than normal average speed, a capacity of 100 hp. might be necessary.

"A shaft extension is provided on the end of the countershaft for pulley, for belt drive to the hand-wheel for standard cable tool drilling which may be resorted to for completion of the well after the oil sand has been reached. The combined use of rotary and standard cable tool drilling is quite general practice in many fields. At the present time, there are seven of these rigs working in the Los Angeles territory, which have successfully handled rotary drilling work to a depth of 3000 ft. and finished wells with standard cable tools to a depth of 4200 ft.

Bread Baking

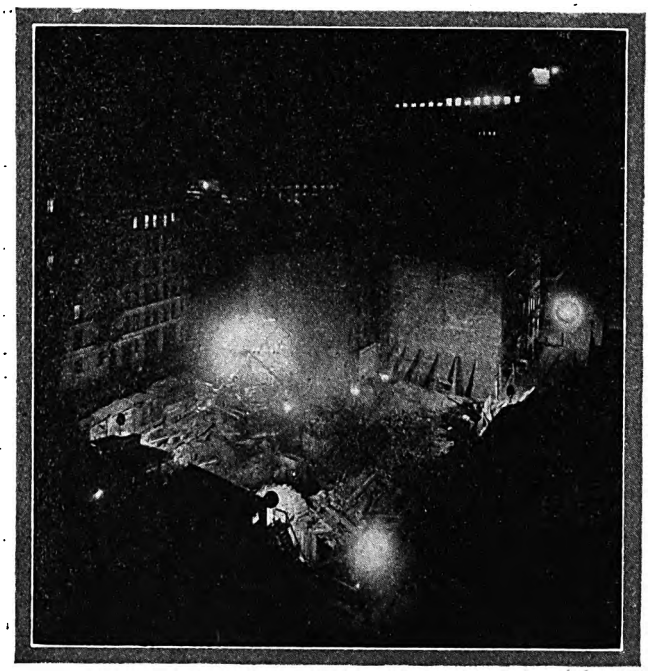
"The bread-baking industry has been one of the last to take advantage of the inherent qualities of electric heating and presents a very attractive field today for both the manufacturer and central station. The more progressive baking concerns have been keenly interested in this method of baking for the last decade, but until recently only small-sized ovens have been available.

"To meet the demand of the large bakeries, a continuous type automatically controlled oven has been developed in five sizes capable of baking from 400 to 1200 1½-lb. loaves per hour.

"Several of these large ovens have been installed and operated for the past year, with most satisfactory results. The quality of the bread is more uniform and better than with gas ovens and results can be duplicated day after day. Since the temperature is automatically maintained, no attention whatever need be given the oven except to place the bread on the trays at one end and remove it at the other. The usual temperature is 450° F. and the conveyor speed such that it requires approximately 35 minutes for a loaf to pass through the oven. Ovens are equipped with four full inches of the best of heat insulators to secure high efficiency. Heating elements are the standard oven heaters of large size nichrome ribbon on porcelain supports and the control is by means of a high-grade thermostat and contactor panel.

"Continuous electric ovens have the advantages of economy, increased production, reduced investment, improved quality and sanitation.

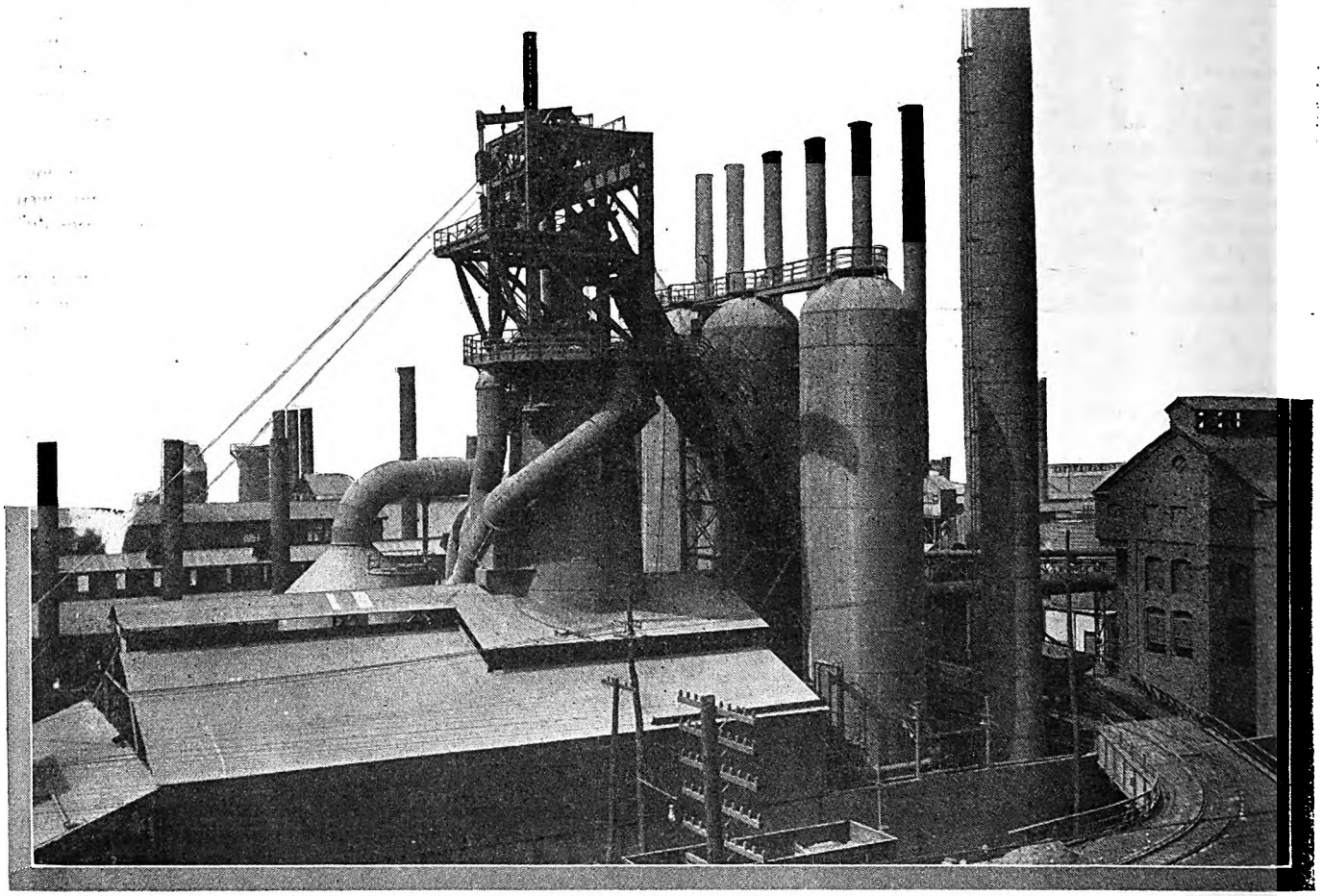
"These ovens operate very close to 100% p.f. and, since practically all baking is done between midnight and morning, furnish a most desirable load to the central station and power companies. Numerous other arrangements of continuous electric ovens of this general type for baking pretzels, crackers, cookies, etc., are also produced."



A rush building job made easy with the aid of electricity. Daylight brilliance was afforded by these lamps, and the excavation operations allowed to proceed without slackening.

Industry Hits Its Stride

A remarkable analysis of conditions affecting specific industries and a well-founded prophecy regarding the speeding up of fall business



The activity of blast furnaces in the Pittsburgh district is first-hand evidence of better business this fall.

INDUSTRY is ready for a striking increase in production this fall. This is shown conclusively by reports on the employment outlook received by the National Association of Manufacturers from its members all over the United States.

According to these reports, the great majority of American factories intend to make great increases in their working forces. Extensive increases are planned in the steel, building, lumber and automobile industries especially; and other industries are not far behind.

John E. Edgerton, president of the National Association of Manufacturers, has analyzed these reports in a statement written especially for THE INDUSTRIAL DIGEST. Mr. Edgerton writes:

"Industry throughout this great land of ours will take on a real and definite spurt as soon as the brakes set upon it by the railroad and mine strikes have been completely released. By this I mean not only the return of the men to work, but an open evidence of a realization that the only way in which to put the country back on a real prosperous basis is to stop quarreling and go to work industriously and conscientiously.

"There can be no doubt in the mind of the public and of general business that the last two disruptions have put a check upon industry at the most inopportune time, at a moment when a majority of our active factories and industrial establishments were preparing to make extensions to meet an increased business that was already assured. Statisticians, official and otherwise, tell us of the hundreds of millions of dollars lost by the railroad and mine operators through the shutdown; of the hundreds of millions lost to the workers themselves through their selective idleness; but they can give no estimate of the other hundreds of millions of dollars lost to business in general by the economic setback. Had not the country been thrown into these disturbing conflicts, the factories throughout the land would today be in a position tremendously better than they were a year ago; and would be operating at a speed we have not seen for two or three years.

"These statements are made advisedly and in view of recent reports received by the National Association of Manufacturers on the employment outlook for the fall and winter. These reports show that *practically every large industrial district in the country was, and undoubtedly still is, planning to make considerable extensions of its forces* in the fall that would put hundreds of thousands of men back to work and add several billions of dollars to the payrolls of the country. The two outstanding strikes not only delayed these extensions, but undoubtedly have made it impossible or impracticable for many of these industries to increase their forces to the full extent they had planned. The processes of reconstruction are much slower than the processes of destruction and it is problematical just how much of a throwback on industry has been occasioned by labor itself.

"Governmental reports show that the production of raw products has more than come back to its own. Our farms have produced more than $1,000,000,000 worth of produce above last year's record; wool production has increased and there are further fine reports on the production of iron. Industrial production would now be keeping up with this magnificent record had we not had the bickerings of the last few months to contend with; but even in spite of these drawbacks, *I am confident that the larger part of our industries will be found to be carrying out their program for extensions almost as fully as they had planned before,* and that our industrial recovery will be speedier than some have thought. The reports we have received on the employment situation show that about six weeks ago practically every basic industry was arranging to take on more men at the beginning of the late summer and fall business. The greater part of these extensions naturally were modest and meant probably the additions of 10% to 15% in the crews. But in some particular districts and particular industries, the organizations were preparing to make large additions, while some were preparing to double their forces. There were unusually promising outlooks for the iron and steel industries, building, automobiles, electrical, machinery and tools, leather products, lumber products, textiles, paper and metal goods. The miscellaneous industries gave an excellent indication.



John E. Edgerton, President of the National Association of Manufacturers, who predicts a decided increase in employment, after canvassing Association members.

"Take a few of these basic industries, in particular:

Iron and Steel

"In the iron and steel industries, for instance, the reports showed unusual activities planned. In the Pennsylvania, Massachusetts and Wisconsin districts, 85% of the factories reporting were planning for varying extensions of their forces; only 15% were pessimistic, some reporting no changes contemplated, others looking for decreases. In the Ohio and New Jersey districts 80% of the reporting plants were setting themselves for additions to their forces, while only 20% were still pessimistic over the near future. In Indiana, New York and Connecticut, 75% of our members were planning extensions, while the other 25% were in various conditions ranging from no change to large reductions. In Illinois and Michigan, extensions were planned by 70%, while 30% were anticipating reductions in employees or no changes. Some of the iron States which do not have such a large number of factories, like Kentucky, Tennessee, Missouri, Rhode Island, and Virginia, reported, however, excellent conditions, in that 100% of those recorded were planning for extensions of forces.

Machinery and Tools

"In the machinery and tool industries, a fine situation was found; 100% of the establishments in Maryland, Wisconsin, Delaware and Indiana reported that they were planning for extensions to take care of increased business that was already in sight. In the Connecticut district, 90% of the plants reporting were planning extensions, while only 2% were taking a pessimistic view. Come of these extending plants were preparing to double their forces. In New Jersey, 85% were planning to take on more men, while only 15% were planning for a slump. In Illinois the comparative percentages were 25 for extensions and 25 counting on no appreciable change. The plants in Massachusetts, Pennsylvania, and Rhode Island were planning for extensions in 65% of the cases; while the remaining 35% were looking for a slackening up of business and a reduction of forces. In Tennessee, New York, Missouri and Iowa, the division was 50-50.

Textiles

"In the textile industries, the key States like Massachusetts, New Jersey, Pennsylvania and New York, made a promising showing; 65% of the reporting factories were planning for extensions, characterized as from small to double, while 35% were anticipating rather poor business. In Tennessee, Wisconsin and Indiana, 85% of the reporting factories were planning for extensions, while 15% were looking for a slump. Connecticut was evenly divided, with 50% planning extensions and the same percentage looking for a setback. Maryland, Minnesota, Virginia, Michigan, Missouri, Illinois, Georgia and Kentucky's factories were all preparing for extensions. Only one State took a complete view along pessimistic lines. That was Rhode Island where the reporting factories showed that 55% were expecting to make cuts in their forces, while 45% were looking for enlargements.

Building

"In the building industries also there was an excellent forecast; 90% of the concerns reporting in New York State were planning for considerable extensions, many of them classed as large. Only 10% were expecting bad business. In Ohio and Pennsylvania 80% of the reporting concerns were planning extensions, many of them classed as large; while 20% looked for reductions or no change in their forces. In Illinois, extensions were planned in 75% of the reporting concerns, while 25% looked for bad business. In Missouri and Iowa, 100% reporting looked for extensions. In Massachusetts and Connecticut, the proportion was 60% for extensions and 40% looked for bad business. In New Jersey it was 50-50.

Automotive

"In the automobile business there was an appreciably good flavor, 100% of the reporting firms in Indiana, Massachusetts, Iowa, Pennsylvania, Rhode Island and New Hampshire planning for extensions. In Illinois 80% were planning extensions, while 20% were looking for a decline. In Connecticut the percentage looking for extensions was 75%; while in New York State it is 70; in Ohio 65%, while 35% were expecting a dropping off of business.

Metal Goods

"In the metal goods industries there was also a good general trend, although not so strong as in other industries. In Illinois and Connecticut, two of the more important States in this industry, 75% of the factories reporting planned for larger forces; in New York and Ohio 65% were planning extensions, while 35% were looking for a deteriorating business, some of them anticipating material reductions. In New Jersey, Missouri and Michigan the firms reporting were about evenly divided between the optimistic and the pessimistic. In four States—Massachusetts, Pennsylvania, Rhode Island and Wisconsin—the reporting firms were 100% planning extensions.

Paper

"In the paper manufacturing industry, there was also good showing. In Illinois and New Jersey, the firms reporting were 100% planning increases. In Ohio, 85% were looking to extensions, while the 15% reported on a more or less pes-

simistic tone. In Connecticut and Wisconsin, 80% were planning for extensions, while 20% were anticipating bad business, with consequent reductions in forces. In New York, 65% were expecting better business, while 35% were lined up on the indifferent side. Some of the latter were expecting large decreases in their forces. In Michigan and Massachusetts, the percentage of extending concerns was lowered to 60%, while 40% were already beginning to make reductions. In Indiana the pessimistic tone overshadowed the optimistic, as 65% of the reporting concerns were making arrangements to decrease their forces; while only 35% were looking for extensions, although some were classed as double existing forces.

How Industry Plans to Increase Its Labor Forces This Fall

Tabular summary of reports received by the National Association of Manufacturers on the plans of its members to take on additional help in order to speed up production.

	Percentage of membership of N. A. M which will increase their forces
Automobiles	
Indiana, Massachusetts, Iowa, Pennsylvania, Rhode Island and New Hampshire	100
Illinois	80
Connecticut	75
New York	70
Ohio	65
Iron and Steel	
Pennsylvania, Massachusetts and Wisconsin	85
Ohio and New Jersey	80
Indiana, New York, Connecticut	75
Illinois and Michigan	70
Kentucky, Tennesee, Missouri, Rhode Island and Virginia	100
Machinery and Tools	
Maryland, Wisconsin, Delaware and Indiana	100
Connecticut (Some plants will double their forces.)	90
New Jersey	85
Illinois	75
Massachusetts, Pennsylvania and Rhode Island	65
Tennessee, New York, Missouri and Iowa	50
Metal Goods	
Illinois and Connecticut	75
New York and Ohio	65
New Jersey, Missouri, Michigan	50
Massachusetts, Pennsylvania, Rhode Island and Wisconsin	100
Textiles	
Massachusetts, New Jersey, Pennsylvania and New York	65
Tennessee, Wisconsin and Indiana	85
Connecticut	50
Rhode Island	45
Maryland, Minnesota, Virginia, Michigan, Missouri, Illinois, Georgia and Kentucky	100

	Percentage of membership of N. A. M. which will increase their forces
Building	
New York	90
Ohio and Pennsylvania	80
Illinois	75
Missouri and Iowa	100
Massachusetts and Connecticut	60
New Jersey	50
Paper	
Illinois and New Jersey	100
Ohio	85
Connecticut and Wisconsin	80
New York	65
Michigan and Massachusetts	60
Indiana	65
Lumber and Woodworking	
Illinois, Iowa, Tennessee, Wisconsin, Louisiana, Nebraska and Washington	100
Ohio, Indiana and Michigan	80
New York and Pennsylvania	75
Leather	
Six States (not specified)	100
Pennsylvania	65
Maine, New Jersey, New York and Ohio	50
Massachusetts	55
Electrical	
Connecticut, Illinois, Missouri, New Jersey, Pennsylvania and Michigan	100
New York and Ohio	65
Massachusetts	85
Miscellaneous Industries	
Maryland, Minnesota, Delaware and Kentucky	100
Illinois	80
New Jersey, Tennessee, Rhode Island, Michigan, Wisconsin	85
New York, Massachusets, Pennsylvania	75
Connecticut, Missouri, Indiana and Iowa	50

Lumber

"In the lumber and wood-working industries, we found a very hopeful tone, probably reflected from the boom in the building industries. Seven States—Illinois, Iowa, Tennessee, Wisconsin, Louisiana, Nebraska and Washington—showed that the industries were planning extensions in all of the reporting concerns. In Ohio, Indiana and Michigan, 80% of the firms were plannig extensions, while only 20% were expecting a slackening of business. In New York and Pennsylvania, increases in forces were expected in 75% of the reporting concerns; while 25% were anticipating a slump, some of these expecting large reductions in their forces.

Leather

"In the leather manufacturing industries there was also a good tone; 100% of the concerns in six States reporting were planning extensions, ranging from small to large. In Pennsylvania, 65% were planning extensions, while 35% were looking for reductions. In four States—Maine, New Jersey, New York and Ohio—the reporting concerns were evenly divided, half making extensions and the other half reductions. In Massachusetts, 55% were making extensions.

Electrical

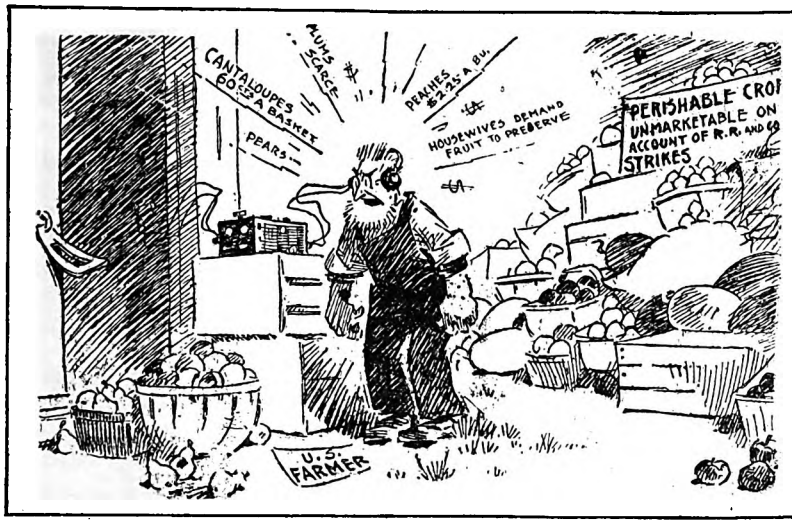
"In the electrical industries, six States showed extensions planned in 100% of the concerns reporting, the radio craze naturally being responsible for much of this development. These States are Connecticut, Illinois, Missouri, New Jersey, Pennsylvania and Michigan; while New York and Ohio were planning for extensions in 65%; 35% looked rather dubiously on the future. Massachusetts reported 85% planning increases.

Miscellaneous

In the miscellaneous industries there is a very healthy showing in the larger States. In Maryland, Minnesota, Delaware and Kentucky all the reporting concerns were planning extensions. In Illinois 80% were making extensions, while 20% were expecting declining business. New Jersey, Tennessee, Rhode Island, Michigan, and Wisconsin were arranging for increases in 85%, while 15% were on the pessimistic side. New York, Massachusetts, Pennsylvania were extending in 75%, while the 25% reported reductions planned from small to a cut of one-half. Connecticut, Missouri, Indiana and Iowa were split between the good and bad, half of them reporting extensions, while the other half were planning reductions.

"I believe, with the strikes now in process of settlement, that we have come to the point where we need more than peace in our industrial fabric. We need peace in our legislative fabric just as well—peace with Congress on our taxation problems, and on our tariff problems. The manufacturers are affected by these questions more than any one other class. Politicians, in their ignorance of the action and reaction of economic law, cannot be expected to treat these matters wisely. If the problems are left to the well-organized management of other interests. the consequences can easily be imagined. The time, therefore, has arrived when the manufacturers must come out from their selfish isolation and, through the submerging of their pride of individual opinion, when necessary to united action and through energetic cooperation, solidify themselves into a constructive working force for the solution of the complex and stupendous problems that are in the way of our progress. *(Turn to page 1656)*

Aspects of the Crops Situation



(Chicago Daily News)

Radio joys—news from the city.



(Capper's Weekly)

In need of an entirely new outfit.

Do Your Christmas Shipping Early

Otherwise shipments are almost certain to be seriously delayed by the rail freight jam which is slowly but surely materializing

DO your Christmas shipping early! Manufacturers this year should heed this modification of the familiar Yuletide slogan, because a little later in the season there is quite sure to be a terrific rush on the railroads, and perhaps those who delay too long won't be able to ship at all.

The long-predicted freight congestion seems to be coming true, even though slowly. Embargoes are becoming more numerous, and it seems that when things get going at full tilt the railroads will find themselves tied in knots. It is still possible to ship, however, and it is therefore advisable to take full advantage of the opportunity before it disappears.

Of course the railroads do not admit that there is any danger of a serious congestion. They are in good shape to handle all the business that may come their way, they say; and the public need not fear that they will fall down on the job. Yet there is reason to suspect that the shopmen's strike left the roads—especially those of the West—with less usable equipment than they should have to meet the conditions of the present and the immediate future.

Conditions are such that a severe strain will be placed upon the roads. Reports to the National Association of Manufacturers, fully set forth on page 1612 of this issue of THE INDUSTRIAL DIGEST, indicate that the factories of the country will be greatly speeded up. That means that a lot of goods will be shipped. The crops are large; and they, together with the food products that are manufactured from them, will continue to keep a number of cars occupied for some time to come.

Shipments of coal are already beginning to cause congestion. Coal production is being held in check by the diminishing supply of cars, according to market reports in *Coal Age*. The surplus of empties on hand when the strike ended has dwindled to almost nothing, says this magazine, and a shortage is now general. This is in spite of the fact that the mines have only begun to furnish us with our winter's supply of fuel. If a car shortage is felt this early in the game, what is to be expected later?

The railroads see prosperity ahead. They are gleeful over the settlement of the strike, for they see months of rushing business ahead of them. A. H. Smith, president of the New York Central lines, gleefully gave out this statement when the settlement of the strike on his road was announced:

"The New York Central management feels that today's settlement is a happy augury of a better era in the conduct of transportation service. In its continued efforts to bring about a return to the former practice of direct negotiations and amicable settlement, the railroad officials have felt that the public interest in this period of fast returning industrial activity demanded that the conflicts of the companies and their employees be composed on a just and lasting basis that will guarantee uninterrupted service and insure economical and efficient operation.

"The country is entering a period of industrial revival. With winter ahead stoppage of coal mining for five months requires that this vast tonnage must be moved in an unprecedentedly short time. The farmers have large crops to dispose of and it is of prime importance that they be protected in reaching their markets. Sufficient and efficient transportation is the foundation and the substance of the nation's life.

"The New York Central lines, which serve about 40 per cent of the population, including the great Central States and New England, in meeting the situation have in recent weeks transported a very large and constantly increasing tonnage.

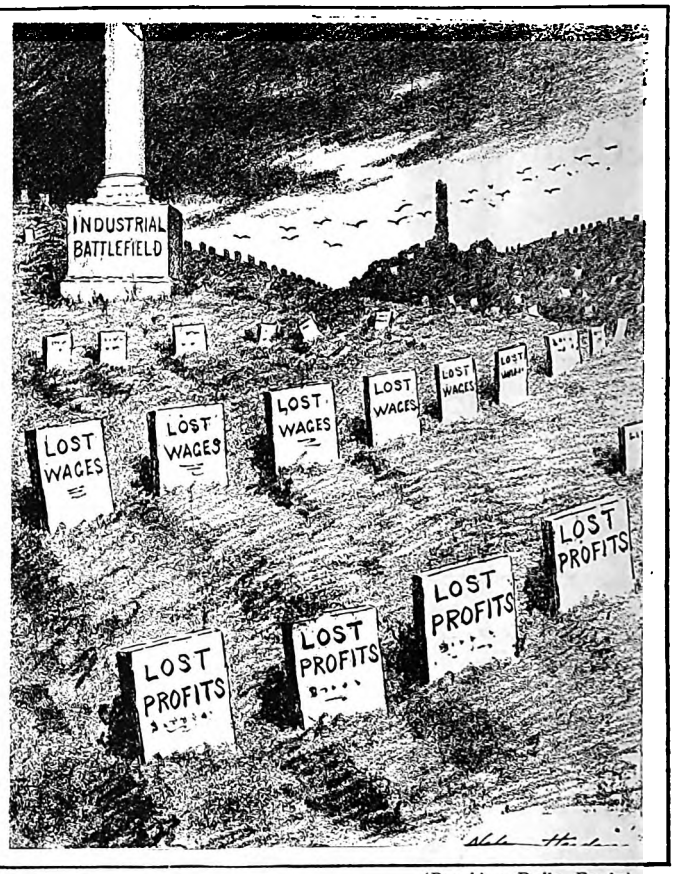
"Since the shopmen's strike commenced, on July 1, this railroad system has contracted for 250 new locomotives. Early this year there were purchased 75 locomotives and 19,000 new box cars. The public may rest assured that no effort or cost will be spared to protect essential traffic and render the utmost service."

Well may Mr. Smith and the other railway men rejoice, for a lot of freight is coming their way. In the last analysis, manufacturers have reason to be glad too, for although freight congestion will be inconvenient, it will mean that there are a lot of goods being shipped, and it is certainly better to have manufacturing active, and its products piling up in the railroad yards, than to have an inactive season. Moreover, those of us who ship early may be able to avoid the worst of the congestion.



(New York Tribune Syndicate)

Time to try a different kind of clock.



(Brooklyn Daily Eagle)

The waste of the latest war.

"It Must Not Happen Again"

So Congress says of the coal and rail strikes—yet there is no agreement as to the method of prevention

IN order to achieve popularity in Congress, it appears that labor legislation must, above all else, be harmless. That may be the reason why investigating commissions are so frequently appointed—and accomplish so little.

According to the *Louisville Courier-Journal,* Congress is not interested in any searching study of fundamental conditions, but only in the immediate effects of the existing deadlocks between employers and workers. The House appears to be completely indifferent to the problem, and even the Senate, although slightly more concerned, has taken no decisive action. Only plans that offer a remedy for the existing troubles are being considered. There, however, are, in the minds of Congressmen, good and sufficient reasons for such an attitude. Chief among the reasons is the fact that the all-important elections are approaching. Very little time can be stolen from political speechmaking.

In response to a canvass recently undertaken by the *Courier-Journal,* to ascertain what constructive views were being applied by Congress toward guaranteeing industrial peace, few constructive answers were given. The following questions were asked:

"First—Can Congress pass and would you favor legislation making it a criminal offense to conspire to promote strikes involving national utilities, such as mines and railroads, with jail or prison penalties for those conspiring or seeking to promote such strikes?

"Second—What legislation or steps would you suggest as best to be undertaken by Congress to prevent a repetition of present mine or railroad strikes?

"Third—Do you favor a national industrial court along the lines of the Kansas tribunal?

"Fourth—Do you favor a law that would prohibit men engaged in the employment of nation-wide utilities from striking in a body, and can such a law be constitutional?

"Fifth—Do you suggest vesting permanent power in the hands of the President to make impossible a future industrial crisis involving national utilities?"

Obtaining "yes" and "no" answers to these questions was not undertaken where members of Congress preferred to express their own views.

Generally speaking, House members are opposed to any kind of anti-strike legislation that would impose criminal penalties or imprisonment for striking or interfering with the "fundamental right of a worker to quit work"—in a ratio of perhaps ten to one. In the Senate many influential members agree that at least anti-strike legislation affecting the railroads is necessary, but they admit that it will not be passed by the present Congress.

Constitutionality of anti-strike legislation is widely doubted. Twenty say that it would be unconstitutional to one or two who say that it would not be. The ratio of expressions against compulsory arbitration is about two to one. It is said to have proved a failure because of lack of confidence on the part of labor.

Senator Stanley, Kentucky, is quoted thus:

"Every man has a natural and an inalienable right to determine for himself for what compensation and under what

(*Turn to page 1657*)

Beating the Tariff to It

Importers and wholesalers have been racing to beat the Fordney-McCumber measure—and in either case the manufacturer loses the race

SINCE the last issue of THE INDUSTRIAL DIGEST, the tariff has been changed from a threat to a promise. True, the promise is not one of prosperity for American industry, but rather one of high prices and a precarious position in the markets of the world on which we must now depend for our real industrial success.

And since the pressure put behind it has been so strong from the start that it was evident that nearly all of the dangerous schedules in the measure were to be jammed through, importers and wholesalers have been straining every cable and radio to get goods into this country and through the customs before the bad news became a reality.

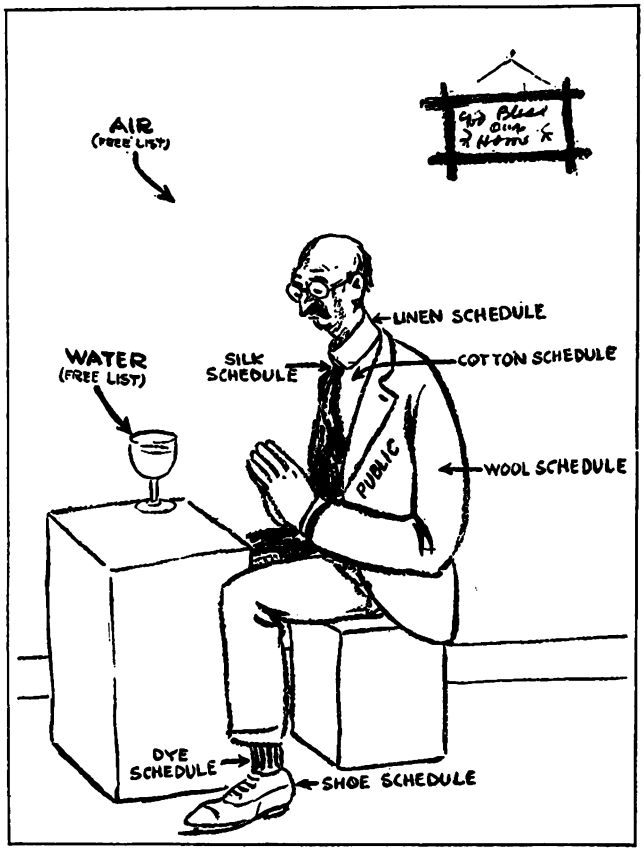
An enormous amount of foreign goods has been brought into our Eastern ports within the last three months. During July, imports were $13,000,000 higher than a year ago. Although Asiatic imports were $8,000,000 less, there were large increases from Europe, Canada, South America, and Australasia. While commodity imports decreased 10.6%, collections on direct imports increased from $9,613,000 for July, 1921, to $16,904,000 for July, 1922, and on withdrawals from warehouse from $3,829,000 to $7,302,000.

The imports during August were valued at $271,000,000, which was the largest total in any month since November, 1920. The total in July, 1922, was $252,135,481, while in August, 1921, the imports amounted to only $194,768,751.

For the eight months ended in August, total imports amounted to $1,942,543,249 as against $1,693,404,235 in the corresponding eight months of 1921. The excess of exports over imports in August was only $31,000,000, the smallest margin for several years.

According to some reports, large amounts have also been released from bonded warehouses and passed through the customs. For 16 days up to September 20, inclusive, the duty collected at the Customs House in anticipation of the signing of the new law was $26,635,782.53 as against the same days last year of $9,337,-563.05. On the day the bill passed the Senate, the duty collected at the Customs House, New York, was $3,464,447.94, the greatest collection for one day in the history of the Customs House.

Short-sighted manufacturers who sponsored and backed the bill did so in order to keep out foreign competition. These manufacturers claimed that the tariff would have no detrimental effect on our exports. And yet the facts are plain enough. The proof of a tariff is in the imports and our imports have been increasing amazingly while our exports have been constantly declining.



(Louisville Courier-Journal)

A "tariff success" dinner.

Those manufacturers who intend to raise prices on their product because of the tariff will find it difficult to dispose of these goods until the imports now passed through the customs are worked off through retailers to consumers. And yet, since prices are steadily climbing on almost every manufactured commodity, and since these prices will be effective from the consumer's point of view, whether the wholesaler has bought his goods at the American manufacturer's price or imported them 20% cheaper, the ultimate consumer will pay the higher price for practically all of the goods which have been rushed through New York, Philadelphia, Boston and Baltimore in the last few weeks.

Meanwhile manufacturers will find it increasingly difficult to sell abroad. In this case it is not a question of the market—the market may be there, but funds to pay for the goods purchased will not. Europe can pay for commodities in the long run only by selling commodities to us in return. With a high tariff fewer foreign commodities will enter this country. Therefore manufacturers in this country will find themselves hard put to it to discover any way of getting around a fundamental economic law.

What Can Be Expected of the Tariff

ALTHOUGH the immediate effect of the tariff will be, naturally enough, a decrease in merchandise imports, its effect as a discouraging factor in import trade might easily be overestimated. The point is this: between the time a tariff is passed and the time domestic prices are raised on account of that tariff, imports are slowed down very considerably, but by the time prices have reached their "tariff-level" (which is to say, by the time prices have been raised by manufacturers as high as they dare to raise them under the tariff) imports will have reached almost normal heights again. After that time, since it will be almost as profitable to import, pay the duty, and sell at high prices, as it was to import under the old tariff and sell at lower prices—merchandise imports will be at almost the same level they were before the bill went into effect.

And thus the two chief results of the tariff bill will be, first, to raise prices in this country considerably higher than world prices, and second, to reduce our exports and slowly increase our imports, until the trade balance is approximately restored.

But since this nation is now a creditor nation instead of a debtor nation, the decrease in exports will eventually be felt most keenly by those manufacturers who have, possibly, carried protection too far.

—Q. E. D.

World's Cotton Crop Larger Than Last Year! What Will Prices Do?

ACCORDING to reports received by the United States Department of Agriculture, the cotton harvest in the three countries that produce between 85% and 90% of the world's cotton supply, is slightly larger than that of last year.

The cotton acreage of the United States increased 10% over the acreage planted last year, and production of 10,575,000 bales is forecasted. Acreage in Egypt has increased 13% with production forecast at 1,000,000 bales. The area planted to cotton in India up to August 1, which normally represents about 60% of the total crop, is 4% larger than the quantity planted up to the same date last year, and production of 3,300,000 bales is forecasted.

Acreage planted in the United States for the picking season of 1922-1923 is 34,852,000 acres, as compared with 31,678,000 acres in 1921-1922, and 35,878,000 acres in 1920-1921. Acreage figures for India show 12,496,000 acres in 1922-1923, compared with 11,976,000 acres in 1921-1922, and with 13,293,000 acres in 1920-1921. Acreage in Egypt is reported at 1,521,000 acres this year compared with 1,341,000 acres in 1921-1922 and with 1,897,000 acres in 1920-1921.

Acreage in Russia is estimated at from 216,000 to 270,000 acres, but, estimates for that country cannot be depended upon as giving more than a very general idea of the crop. Good crops are also reported in Brazil and China.

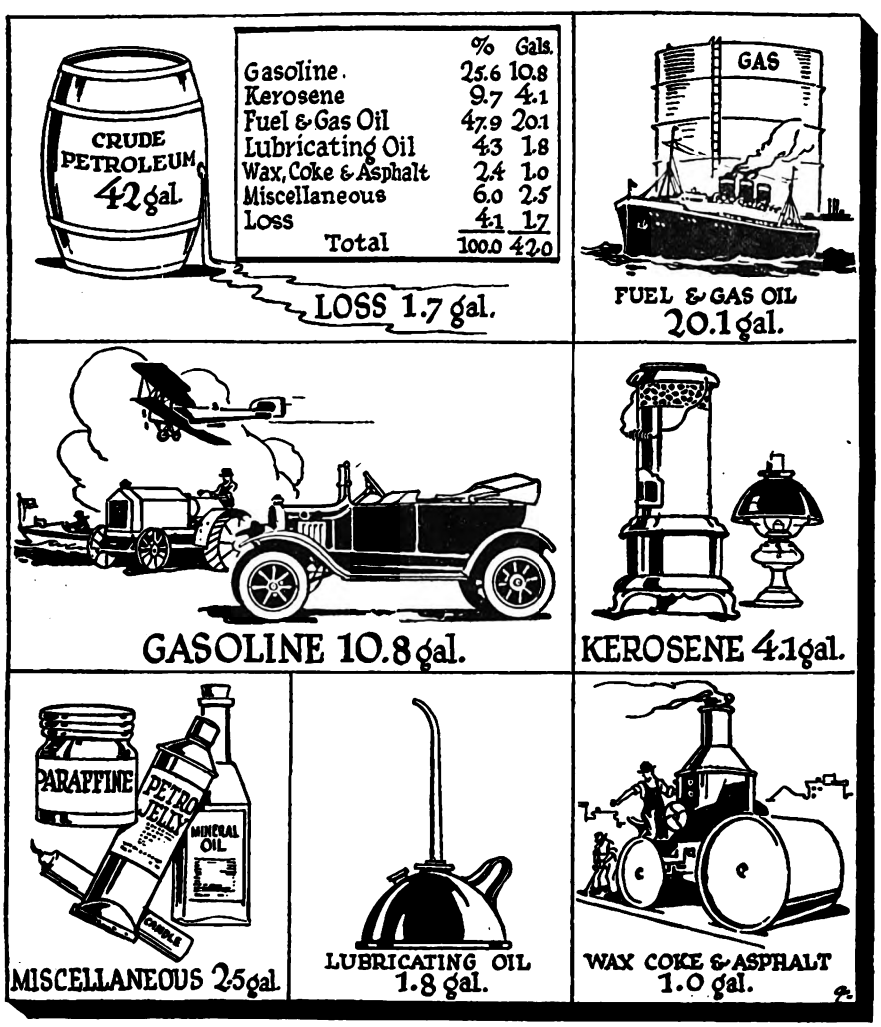
Impossible to Control Oil Prices

OIL is assuming a position of constantly increasing importance in the economic life of the country, due both to the greatly increasing production and consumption and to the wider adaptation of oil to fuel purposes. For a long time increasing consumption outdistanced production and presented splendid opportunities for price increases, sometimes not wholly justified by the famous law of supply and demand. Coincident with the rapid increase in consumption there has been a substantial decrease in crude prices, occasioned largely no doubt by the tremendous output in this country since spring and by the ample supplies imported.

The issue was recently raised that large oil interests had it within their power to control prices. In answer to this contention, R. L. Welch, Secretary of the American Petroleum Institute, said in a statement to the Senate Committee on Manufactures:

"No one oil company, or group of oil companies is strong enough, under existing conditions in the industry, to fix an arbitrary price for either crude oil or its products, in violation of the law of supply and demand. The price of Mid-Continent crude of which there is too much has declined from $2.00 a barrel to $1.25. Since November 1, 1921, the oil industry has been producing and importing more oil than was consumed or exported by this country."

There has never been any such accumulation of oil in the same length of time at any period in the history of the oil business. The great bulk of the refiners do not control their crude oil supply; they buy it on the open market. Irrespective of what it costs the producer to get the oil—it may cost $3 or $4 or $5—the refiners buy the oil in the same way a man would go out and buy wheat from a farmer. The question of the farmer's cost would not be the controlling factor. Overproduction will force down the price of oil, just as a demand in excess of supply will cause the market to rise.



What Comes Out of a Barrel of Crude Oil

EVERY time you use five gallons of gas in your car somebody has to pump a half barrel of crude oil out of the ground. It takes nearly four barrels of oil to make one barrel of gasoline. Yet the crude oil of the United States and Mexico is produced primarily for gasoline. A digest of oil figures compiled by the *American Petroleum Institute* for 1921 shows that 405,000,000 barrels of oil were used in the form of petroleum products other than gasoline. There are 42 gallons of oil in a barrel. Of these 25% goes into gasoline; 9.7% kerosene; 47.9% fuel and gas oil; 4.3, lubricating oil; 2.4 wax, coke, and asphalt; 6% miscellaneous.

Improvements and Inventions

New Method of Making Sulphuric Acid

A NEW apparatus for making sulphuric acid has been successfully applied on a practical scale in South Africa. The old familiar lead chambers, which are so costly and occupy so much room, are replaced by small, horizontal cylinders, which are filled with perforated plates. The sulphurous gases, mixed with water and nitrogen oxides, are converted into sulphuric acid in these cylinders. The rest of the apparatus in the plant is the same as that in the regular chamber plant.

Improved Disinfectant Soap

AUSTRIA reports a new development in the manufacture of disinfectant soaps, which it is claimed has proved a decided success. The disinfectant used is lactate of silver, and a very small amount produces remarkable results. The soap has been used in hospitals for general washing purposes, for sterilizing instruments (it does not contain any corrosive ingredients and hence can be safely used for this purpose), disinfecting clothes, rubber gloves, etc. There are several uses for the new soap in cosmetics.

The soap is made by dissolving one part of the silver lactate in 15 parts of water and then adding enough agar-agar, or carrageen moss, to make a jelly. The mixture is then added to the regular soap batch, and the resulting product can be made into solid, paste or liquid. In the solid form it can be used for toilet or laundry purposes. In the paste form it is usable as a dentifrice. In liquid form it may be used as a gargle and mouth wash.

White Paint Made Resistant to Light

PAINTERS like to use lithopone because of its many good qualities. This white pigment is, however, not recommended for outside work, due to the fact that it darkens when the painted surface is exposed to sunlight. A French investigator has determined that it is the ultra-violet rays of light that cause the pigment to darken. To prevent the action of these rays, it is only necessary to surround each particle of lithopone with a layer of material which is insensitive to light and which at the same time does not impair the good properties of the pigment. Such materials are blanc fixe, alumina and oxide of zinc. A lithopone paint made in this way gives most excellent results.

Linoleum Substitute

IN refining crude oil, sulphuric acid is used to remove certain impurities, which are recovered in the form of an acid tar. From this tar there can be obtained an oil, which, when treated with various metallic salts such as zinc oxide, magnesia, milk of lime, etc., will give a product of more solid consistency. To this substance is added resin, copal gum and driers, and then ground-up cork, wood meal and mineral colors. The resulting mass can be formed into sheets, which have the appearance of linoleum and possess all the advantages thereof, but is much lower in cost.

New Photographic Process with Selenium

NO bromide of silver is used in this process. Within the camera there is arranged a glass plate which is covered with a thin coat of the metal selenium. Against this coating there is pressed a piece of thin, transparent paper, which is impregnated with an electrolyte and which is in contact with another metallic plate. The latter plate, as well as a transparent layer of gold or platinum which is placed between the selenium and the glass, are connected with the source of current. Selenium is that peculiar metal which is so affected by light that it becomes a conductor of current in accordance with the intensity of the light that strikes it. This means that the stronger the light, the more current it will conduct. The light, striking the selenium film, causes conduction of electricity to take place through the paper impregnated with the electrolyte, with the result that the latter is decomposed and an image is formed, the tones of the same being caused by the variations in the intensity of the current flowing through the electrolyte. The intensity of the current is in turn dependent on the intensity of the light striking the selenium film.

Pressed Paper Pipes

PRESSED paper pipes are being used to some extent in Germany and other European countries, and the results are said to be successful. The piping is made from hard paper (vulcanizer paper), or from pressed paper, and possesses considerable mechanical resistance, both internally and externally. In comparison with metallic piping, paper piping has the advantage of lightness, ease of working and great resistance to chemical influences. The paper piping can be easily sawed, bored, planed, nailed and worked in other ways. Paper piping is a very poor conductor of heat and electricity and hence does not require any costly insulating covering. Any size piping from a diameter as small as 5 millimeters can be made. The piping may be used most advantageously for transporting oils, warm and cold gases of all sorts, weak acids, chemical liquors, etc. It can also be used to good advantage in mining.

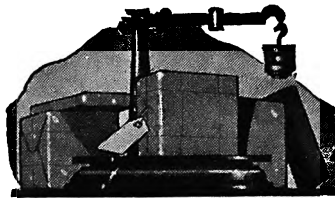
New Aluminum Solder

SOLDERING aluminum is always a difficult procedure, and similarly the soldering of other metals, while perhaps not so difficult as that of aluminum, always presents the danger of producing an electrolytic action by the conjunction of two dissimilar metals with resulting decomposition of the metal due to the electric current which ensues from the electrolytic action of the two different metals on coming in contact with salt solutions.

A new solder introduced on the German market is claimed to avoid this difficulty. It can be kneaded just like clay and easily spread over the surface of a broken piece of metal that is to be mended, when heated to the proper temperature. However, it never melts or congeals directly. It does not oxidize and consequently ensures a homogeneous joint. The ease with which it is molded makes it possible to form any shape with it, and in this respect it is especially useful for correcting faults in castings.

Magnesium Sulphate, a New Fertilizer

THE addition of a new member to the family of fertilizers is being heralded. Potash, nitrogen and phosphorus have long been an inseparable trio and it appears now that it will be increased into a quartet by the addition of magnesium sulphate. An examination of the green coloring agent, chlorophyll, which is found in all plants, reveals the fact that it contains magnesium. Inasmuch as this substance is the active agent which brings about growth of plant structure through the influence of light, magnesium is an important element in plant life. Almost every crude potash fertilizer will be found to contain magnesium and that accounts for its getting into the soil. It also explains why certain potash fertilizers have given so much better results than others. Actual scientific tests have been made with potatoes, growing on land fertilized with magnesium sulphate in Germany, and the results have indicated that distinctly better potatoes were obtained in this way. No definite conclusions have been reached as yet, but the matter, as it stands, is of considerable interest in this country, where there are large deposits of natural magnesium sulphate.



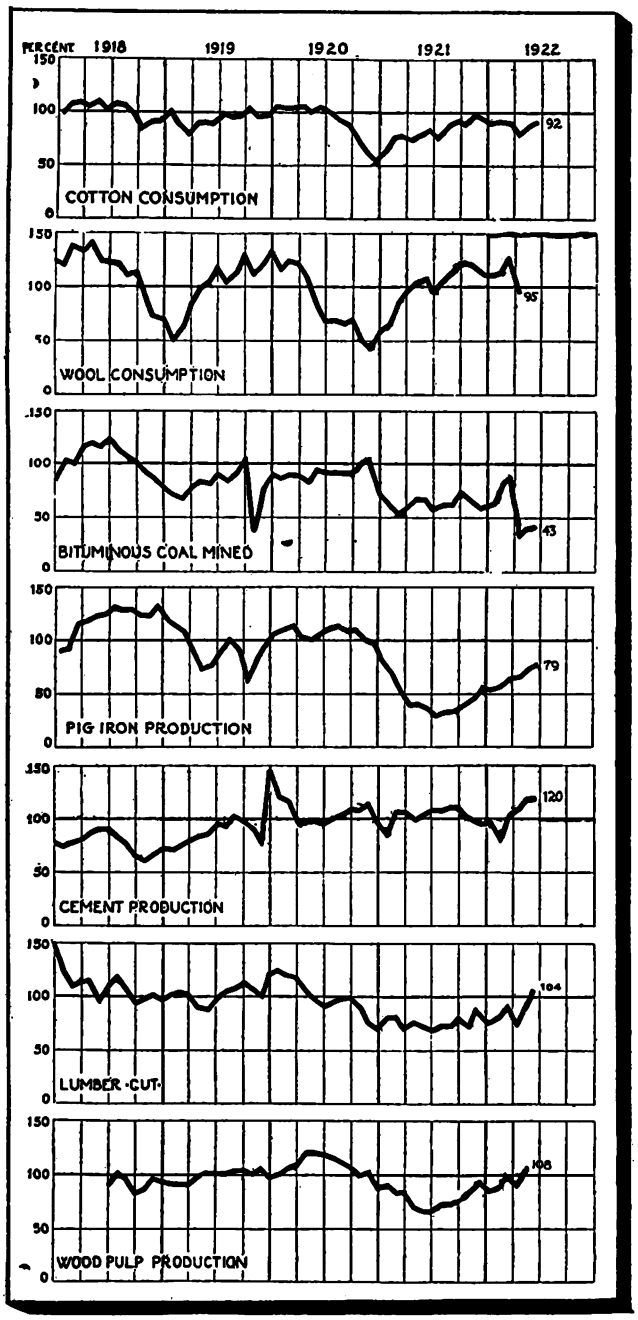
AT A GLANCE



Fuel, Power and Electricity

FIRST reports from the coal mines indicate a healthy resumption of production, although both anthracite and bituminous for August were still considerably below normal figures. The output of bituminous coal in August totaled 25,800,000 tons compared with 7,000,000 tons in July, and 34,548,000 tons in August, 1921. Anthracite production, 161,000 tons, showed no substantial change from the preceding months, since mining was not resumed until September. By-product coke production, however, suffered a decline, although beehive increased. The by-product production figures for August, 1922, July, 1922, and August, 1921, respectively are: 1,794,000 tons, 2,486,000 tons, 1,383,000 tons.

Electric power for public utilities showed a slight increase during the summer. Kilowatt hours for July were 3,843,000,000 compared with 3,833,000,000 for June and 3,270,000,000 for July, 1921.



Monthly production in basic industries (normal production = 100%.) Allowance made for seasonal variation and year-to-year growth.—*(Federal Reserve Bank, New York.)*

Crops

RECEIPTS, shipments and visible supply of wheat for August showed a marked increase over the preceding month, although none of these movements reached the level of a year ago. The condition of wheat, corn and cotton on September 1 was as follows:

	Condition (normal = 100%)		Production (bushels)	
	Sept. 1, 1922	Sept. 1, 1921	Sept., 1922	Aug., 1922
Spring wheat	80.1	62.5	277,000,000	263,000,000
Corn	78.6	85.1	2,875,000,000	3,017,000,000
Cotton	57.0	49.3	10.6 (bales)	11.4
Average, all crops.....			*98.8%	96.4%

*In terms of 10-year average.

Cuban sugar stocks at the end of August were only 460,987 long tons compared with 1,225,285 tons a year ago.

Metals

THE production of most metals suffered a slight decline in August as compared with July. However, there was increased activity in structural steel sales, lead movements and in sales of most of the other metals. The following table shows the metals situation at a glance:

	Aug., 1922	July, 1922	Aug., 1921
Iron ore movement—short tons	8,936,000	8,943,000	4,385,000
Pig iron movement—long tons	1,816,000	2,405,000	954,000
Steel ingot production — long tons	2,532,000	2,843,000	1,301,000
Sheet production—percent of capacity	*72.7	86.4	*19.7
Unfilled orders, U. S. Steel, e.o.m.	5,950,000	5,776,000	4,532,000
Structural steel sales — long tons	135,843	129,160	...
Copper production—pounds...	*91,317,000	96,633,000	*17,790,000
Lead—receipts, St. Louis, lbs.	16,112,000	14,486,000	14,911,000
Zinc production—pounds.....	62,846,000	63,834,000	129,242,000
Zinc stocks—lbs., e.o.m.....	43,258,000	57,236,000	173,098,000
Tin stocks, e.o.m., long tons..	2,806	3,616	1,761

*Month of July.

Building and Construction

AUGUST building activity showed a gain of more than 7% over July and a decrease of 12% below the peak month of June. August ranks as the fourth largest month in the country's building history. Contracts awarded in the 27 Northeastern States amounted to 54,019,000 square feet in August, 51,705,000 square feet in July, and 35,246,000 square feet in August, 1921.

Oils and Petroleum

AMERICAN oil production continues at record-breaking figures. The daily average gross crude oil production for the week ending September 16 has been estimated at 1,493,700 barrels as compared with 1,504,400 barrels for the week preceding, and 1,276,900 for the corresponding week in 1921. The consumption of crude petroleum was 46,593,000 barrels in July, 1922, compared with 45,559,000 barrels the month preceding, and 40,252,000 barrels in July, 1921. The indicated consumption of crude petroleum was 52,644,404 barrels for July, 1922, 47,819,574 barrels for June, and 46,468,791 barrels for July, 1921. The excess of production of this commodity in July was 5,170,117 barrels.



Basic Commodity Prices

(Minimum, at New York, unless otherwise specified)

	Week Ending Sept. 23	Week Ending Sept. 16	Year Ago
Aluminum, pig (ton lots), lb.	.175	.175	.19
Antimony, ordinary, lb.	.06	.06	.0525
Brick, Hudson R., per M.	18.00	19.00	15.00
Cement, Portland, bbl.	1.70	1.70	1.70
Copper, Electrolytic, lb.	.14	.14	.1225
Cotton, spot, Mid. Upl., lb.	.214	.215	...
Hides, Chic. Pack., No. 1, lb.	.22	.21	.14
Lead, N. Y., lb.	.0615	.0605	.045
Petroleum, crude, at well, bbl.	3.00	3.00	2.25
Pig iron, Bessemer, Pgh., ton	35.77	36.77	21.96
Pine, roofers 6 in., M. ft.	33.00	33.00	26.00
Rubber, Up River, fine, lb.	.1875	.19	.195
Silks, Sinshiu, No. 1, lb.	7.70	7.40	5.85
Spelter, N. Y., lb.	.071	.068	.0465
Steel Billets, Bess., Pgh., ton	40.00	40.00	29.00
Tin, N. Y., lb.	.325	.3225	.2675
Wool, Dom., ½ blood com., lb.	.50	.50	.29

Wholesale Commodity Prices

Coal—			
Bit., ¾ in., lump, net ton	...	...	...
Anthracite, egg, net ton	...	...	...
Coke, furnace, net ton	11.50	11.00	3.25
Cotton Goods—			
Brown Sheetings, Std. yd.	.1325	.13	.13
Standard Prints, yd.	.1025	.1025	.11
Print Cloths, 38½ in., 64x60, yd.	.09	.08875	.0875
Drugs and Chemicals—			
Alcohol, ethyl, form 5, gal.	.34	.34	.36
Alcohol, wood, 95%, gal.	.59	.57	.65
Alum, lump, lb.	.035	.0325	.035
Bleaching Powder, over 34%, 100 lbs.	1.90	1.90	2.10
Borax, crystal, in bbl., lb.	.06	.06	.055
Caustic Soda, 76%, 100 lbs.	3.60	3.65	4.00
Lime, factory, 200-lb. bbl.	1.90	1.90	1.90
Nitric Acid, 42°, lb.	.0575	.065	.07
Saltpeter, crystal, 100 lbs.	.0775	.0775	.1075
Soda Ash, 58% light, 100 lbs.	1.75	1.75	2.15
Sulphuric Acid, 60%, 100 lbs.	.50	.45	.55
Flour—			
Spring Pat., 196 lbs.	6.75	6.25	8.00
Winter, soft str't, 100 lbs.	5.15	4.85	6.10
Grains—			
Wheat, No. 2 Red, bu.	1.205	1.12	1.36
Corn, No. 2 Yellow, bu.	.8325	.8125	.7225
Oats, No. 3 White, bu.	.475	.455	.48
Rye, No. 2, bu.	.8775	.845	1.11
Barley, malting, bu.	.77	.74	.76
Hay, No. 1, 100 lbs.	1.25	1.20	1.25
Straw, lg., rye, No. 2, 100 lbs.	1.25	1.25	1.00
Hides—			
Cows, heavy native, lb.	.20	.195	.1325
Country, No. 1 steers, lb.	.14	.14	.08
Iron and Steel—			
Basic, Valley furnace, ton	34.00	32.50	19.25
Steel bars, Pittsburgh, 100 lbs.	2.00	2.00	1.60
Beams, Pittsburgh, 100 lbs.	2.00	2.00	1.60
Galvanized Sheets, No. 28, Pittsburgh, 100 lbs.	4.35	4.35	3.75
Leather—			
Hemlock, sole, No. 1, lb.	.29	.29	.26
Scoured oak backs, No. 1, lb.	.55	.55	.54
Lumber—			
FAS Qtd. Wh. Oak, 4/4", M. ft.	145.00	145.00	135.00
Tonawanda Wh. Pine No. 1 barn 1x4", M. ft.	82.00	82.00	86.00
Adirondack Spruce, 2x4", M. ft.	38.00	38.00	40.00
No. 1 Com. Y. Pine Bds., 1x4", M. ft.	47.25	47.25	37.00
Oils—			
Coconut, spot N. Y., lb.	.085	.085	.10
Crude, tks, f.o.b., coast, lb.	.06625	.06625	.08125
China Wood, bbls., spot, lb.	.1275	.1275	.13
Cottonseed, lb.	.89	.0888	.103
Linseed, city, raw, gal.	.95	.94	.81
Paraffine wax, ref., 125 m. p., lb.	.0325	.035	.0375
Turpentine, gal.	1.33	1.30	.795
Paints—			
White Lead, in oil, lb.	.125	.1250	.1225
White Lead, dry, lb.	.0725	.0725	.065
Zinc., Amer., lb.	.07	.07	.075
Paper			
News roll, 100 lbs.	4.00	4.00	4.75
Book SS. & C., lb.	...	...	6.70
Wood Pulp, ton	...	...	80.00
Sugar—			
Cent. 96°, 100 lbs.	4.61	4.86	4.125
Fine Gran., in bbls., 100 lbs.	6.25	6.25	5.60
Wool—			
Boston Aver. 98 quot., lb.	.7175	.7175	.4102
Stand. Clay Wor., 16-oz., yd.	3.00	3.00	2.85
Fancy Cassimere, 13-oz., yd.	2.45	2.45	2.25
Serge, 36", Wor., yd.	.60	.52	.52
Broadcloth, 54", yd.	2.75	2.75	2.50
Cottonwarp serge, 36", yd.	.45	.45	.45

Financial

Bank Clearings	Week Ending Sept. 23	Week Ending Sept. 16	Year Ago
New York	$4,165,846,904	$4,230,637,802	$3,558,981,516
Chicago	559,376,445	560,378,198	489,200,000
Entire Country.	7,727,000,000	7,895,000,000	6,651,000,000
Increase or decr.	+16.1%	+9.8%	—21.3%
(Per cent of total from preceding year)			

Cost of Money—New York	Week End. Sept. 23	Week End. Sept. 16	Year to Date	Year Ago
Call Loans	6@3½	5@4	6@2¾	5@4½
Time Loans (60-90 days)	4½	4½@4¼	5@3½	5¾@5
Six Months	4¾@4½	4¾@4½	5@3¾	6@5½
Com.Discounts,4-6mo.	4½@4¼	4½@4¼	5@4	6@5¾

Financial Transactions	Week Ending Sept. 23	Week Ending Sept. 16	Year Ago
Stock Sales, shares	5,398,317	5,783,484	3,045,698
Aver. Price, 25 Railroads	69.60 h. 67.33 l.	70.53 h. 68.94 l.	55.05 h. 53.39 l.
Aver. Price, 25 Industrials	108.01 h. 104.67 l.	110.01 h. 107.35 l.	75.91 h. 74.41 l.
Sales of Bonds, Par Value	$65,567,625	$76,166,050	$83,076,600
Aver. Price, 40 Bonds	82.54 h. 82.30 l.	82.44 h. 82.13 l.	71.81 h. 71.33 l.
Average Net Yield, 10 High-Grade Bonds	4.402%	4.402%	5.235%
New Security Issues	$26,904,000	$137,919,400	$20,233,200

Business Failures	Week End. Sept. 23	Week End. Sept. 16	Year Ago
Number	410	333	331
	Aug., 1922	July, 1922	Aug., 1921
Liabilities	$40,279,718	$36,900,000	$42,904,409
Number	1,714	1,743	1,562

Industrial

Building Permits.	August, 1922	July, 1922	August, 1921
	$212,909,181*	$188,155,537†	$154,033,461*

*153 cities. †149 cities.

Idle Freight Cars	Aug. 15, 1922	Aug. 8, 1922	July 8, 1922
Number	308,270	321,897	423,160
Car Loadings	Sept. 9, 1922	Sept. 2, 1922	August 5, 1922
Number	832,744	931,598	851,351
Railroad Earnings	Week ending Sept. 16	Week ending Sept. 9	Year Ago
Gross (15 railroads)	$10,742,410	$10,103,215	$11,632,806
Steel and Iron Barometer	Aug. 31, 1922	July 31, 1922	Aug. 31, 1921
U. S. Steel Orders (tons)	5,950,105	5,776,161	4,531,026
Daily Pig Iron Prod. (tons)	58,586	77,502	30,780
Monthly Pig Iron Prod. (tons)	1,816,170*	2,405,365†	954,193*

*Month of August. †Month of July.

Foreign Trade	August, 1922	July, 1922	August, 1921
Exports	$302,000,000	$305,000,000	$366,887,538
Imports	271,000,000	251,000,000	194,768,751



Stocks Holding Strong

THE stock market during the past fortnight has been erratic but fundamentally strong. Professional trading has sent stocks up and down again; but the fluctuations do not appear to have great significance. Conditions underneath appear still to be sound. Observers think that the long-swing bull movement still has a long time to run. Apparently the market is backing and filling, waiting for industry to recover from the effects of the strikes and hit its stride once more.

Bond Market in Good Condition.

OBSERVERS say also that the bond market is in good condition, and that prices will reach a higher level. There have been some reactions in corporation bonds since this year's upward movement started, yet the list as a whole is strong and advancing. Forty bonds, selected by Dow, Jones & Co., including ten railroad issues of the highest grade, ten second-grade rails, ten public utilities and ten industrial issues, have advanced 8.22 points from the low record of 1922. The greatest average gain, 10.65 points, was made by the public utility bonds, prices of which were lower than in other groups before the upswing started.

There is still plenty of money seeking investment. It is suggested that when business gets really active this surplus money will be taken up, and the bond market will react, or at least cease to rise. There is much in this view; but it must be borne in mind that an extremely complete business revival will be necessary before such a condition is likely to prevail, and since the revival is coming on only gradually, it will probably be quite a while before the rising bond market need fear anything from this source.

Currency Inflation Not Likely

BARRON'S presents the following view of the money situation:

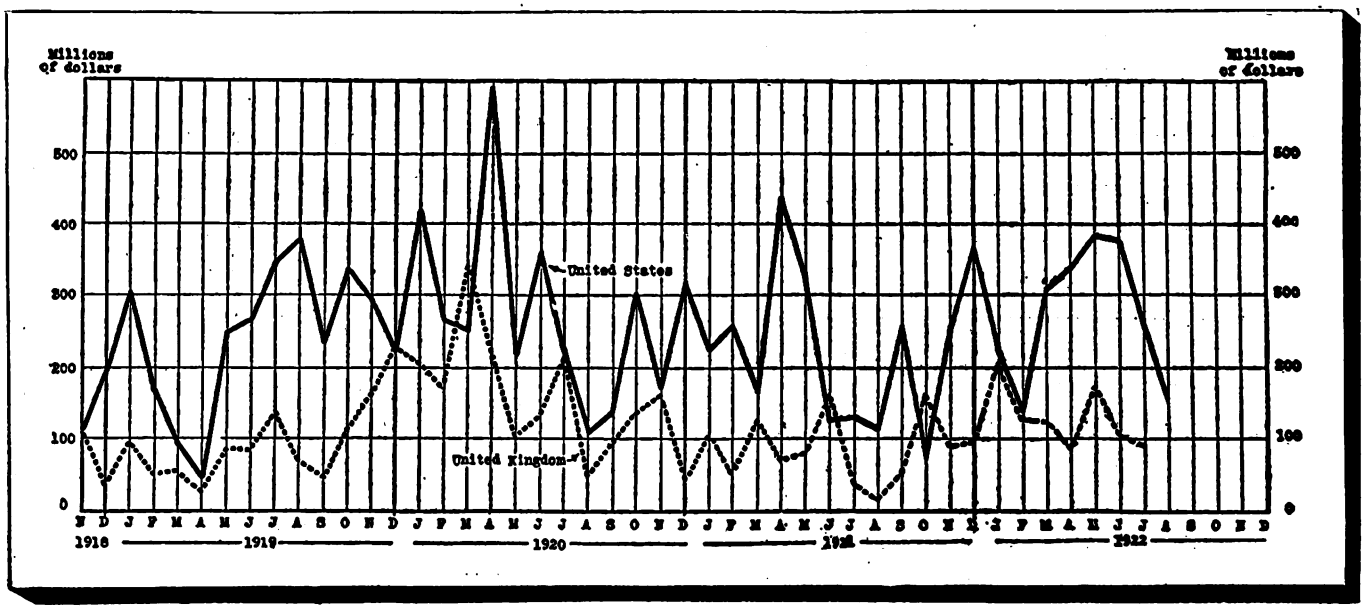
"The long upward swing of the stock market registers among other things, the belief of speculators and others that industrial concerns are due for a renewed period of profitable activity. Money is already in fair demand and loans are likely to increase by easy stages until funds throughout the country become pretty well employed at slightly better returns than prevail at present.

"There are signs of rising prices, though it is not believed that anything like real inflation will follow. With Federal Reserve note circulation based upon actual gold and commercial bills representing actual commodities, a currency inflation is removed from the realm of possibilities.

"All reports indicate an actual labor shortage, especially unskilled labor, which threatens to become more acute as production speeds up. This is not to say that manufacturing lines and wholesale business are all that could be wished. But the tendency is upward. The curve of steel and pig iron production is already near the high levels of 1919 and 1920. Woolen spindles are over 6% more active than in July a year ago and cotton spinning is nearly as active as at that time. Retailers are still buying cautiously, but their orders are constantly increasing in size and frequency. As wholesalers' and manufacturers' prices show tendency to firmness their markets tend to broaden volume and retailers' turnover is accelerated with increased employment.

"Another factor tending to increase the 'loans, discounts and investments' item of the banks and so employment of their funds at better rates is steady improvement in our foreign trade. Exports have been increasing. The vast improvement in our export trade is not fully appreciated. United

(Turn to page 1656)



New Capital Offerings Show Seasonal Lag

**Striking illustration of the decline in the volume of new capital offerings made at New York since last spring and of those made at London appears in the accompanying chart. New flotations ordinarily run lower during the summer months, but no seasonal correction has been attempted because of the extraordinary influences which have been at work during the past three years. New offerings in this country reached their peak during May and then declined persistently until August, which is about what happened overseas. There are already signs, however, that the seasonal lag is at an end. During the present week, for example, the volume of new capital issues jumped to $176,000,000, as compared with only $7,000,000 three weeks ago, the low week for the year. Signs are multiplying of a sharp autumn upturn in the curve.—*(N. Y. Evening Post.)*



General Employment Conditions

CRITICS in all parts of the country agree that the restriction of immigration is responsible for the present labor shortage in practically every line of industry. The resumption of industrial activity has come at a time when farm labor is at its period of greatest employment and when large numbers of foreign born workers have emigrated to their homelands. The shortage in skilled labor is particularly acute and this is attributed to the failure of the apprenticeship system and a lack of proper trade training. The United States Secretary of Labor reports that unemployment has been reduced from 5,500,000 idle and 1,500,000 on part time, which represents normal conditions in the United States. Of the 65 leading cities in the United States, 39 report an increase in employment and 25 a decrease during August, 1922.

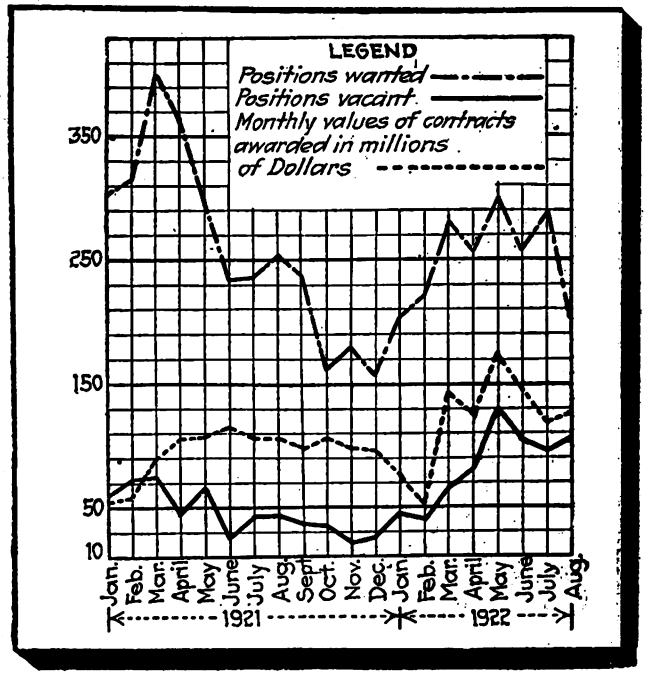
Automotive

THE decision of Henry Ford to close practically all his plants because of difficulty in getting fuel at a reasonable cost threw 100,000 men out of work temporarily. This, of course, had an unfavorable influence in those cities where automotive labor represents a large part of the purchasing power. The return of the men on September 25 has had an easing effect, according to latest reports.

The automotive equipment industry has improved considerably, and in many automotive plants throughout the country there is a gradual increase in the number of workers employed. One plant in Columbus, Ohio, now employs 700 men in comparison with 230 six months ago.

Building and Construction

THERE is a keen and widespread demand for more plasterers, bricklayers, stone masons, carpenters and workers in related trades. The annual volume of State and Federal highway construction has played a large part in reducing the amount of available unskilled labor in the building field. Since the demand for industrial construction holds fairly constant, there will doubtless be a shortage in the building trades all winter.



Number of construction positions wanted and vacant compared with the volume of contracts. The chart compares monthly values of construction contracts awarded with the number of engineering-construction "positions wanted" and "positions vacant" in 1921 and 1922.—*(Engineering News-Record.)*

Chemical

ACCORDING to *Finance and Industry,* chemical and allied products lead the industries which increased employment during the last month. Marked activity is reported in the paint and varnish industry.

Iron and Steel

IN spite of the recent 20% wage increase to workers by the United States Steel Company, a shortage of unskilled labor is still reported to exist in iron and steel centers. Restricted immigration and the attraction of labor to other fields is believed to be responsible.

Lumber

AT the annual meeting of the northern logging congress in Milwaukee, the important part that labor plays in the lumber industry was emphasized by H. S. Gilkey, president of the Minnesota Loggers' Association. In his opinion, "Greater pay for greater service is the key to the solution of the labor problem . . . . other industries have succeeded with it; piece-work has worked well; we are justified in extending the application of the piece-work plan to the logging industry."

Machinery

THE improved demand for machine tools is resulting in a greater demand for unskilled labor and a prospect of higher wages for the skilled workmen in this industry.

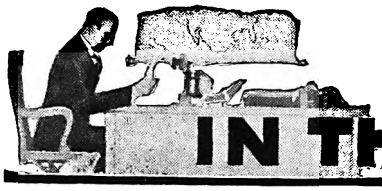
Textiles

ALTHOUGH the mills in the Lawrence (Mass.) district have resumed operations at the old wage scale, the mills in the Manchester district of the Pawtucket valley (R. I.) are still holding out for a decrease in wages. If the Lawrence mills continue to turn out goods at a profit on the basis of the old scale, it is only a matter of a few weeks before the mill-owners in the other districts capitulate. The Pawtucket mills are running with about half of the normal force and the Manchester mills are practically idle.

The revival of the silk trade, especially in broad silks, is providing employment for thousands of men and women in New Jersey, Pennsylvania, and Connecticut.

Transportation

THE Sea Service Bureau of the Shipping Board reports that 84,782 officers and men, 92% of whom were American citizens, were placed on United States ships in the past 12 months. This shows an increase of 23.2% in placement of citizens over the previous years. The cost of placement did not exceed $2 a man, compared with last year's cost of $2.20 and an average of $2.50 to $2.75 for the first two years of the bureau's operations.



IN THE MANAGER'S OFFICE



Management Week

THE week of October 16-21 has been designated as "Management Week" by a joint committee of the American Society of Mechanical Engineers, the Society of Industrial Engineers and the Taylor Society. The program includes joint meetings of the local sections of these societies in every part of the country. Sessions will be open to the public, and executives should take full advantage of this opportunity to enter into a nation-wide discussion of current management problems. The general theme for the week will be "Standards for Measuring the Value of the Work of a Manager or of Management."

Why Accidents Happen

DURING the last decade industry has learned that "Safety First" has more than a humanitarian appeal—it is a profitable business policy. A classification of the causes of accidents frequently suggests the remedy, and the following analysis from the *Safety Bulletin* of the Chicago Bureau of Safety is offered as a comprehensive method of checking the causes of accidents: (1) Class of work beyond physical or mental ability of the injured. (2) Improper tools or devices. (3) Lack of proper instruction. (4) Method pursued not suitable for work. (5) Protective devices not used. (6) Rules or instructions not observed. (7) Protective devices not provided. (8) Lack of proper inspection and maintenance (defective tools, materials and devices). (9) Contributory negligence of others. (10) Intemperance. (11) Mechanical manner of doing work (lack of concentration). (12) Haste. (13) Physical condition of injured. (14) Poor judgment. (15) Wilfulness. (16) Conditions beyond control (a, elements; b, non-industrial).

The Value of Good Lighting

THE importance of good illumination in working spaces is generally recognized but frequently neglected by those who seek to increase production by every new and ready-made system which comes to their attention. Charles Gallo, in *Chemical and Metallurgical Engineering,* describes the advantages of proper lighting as (1) Increased production, (2) Reduced accidents, (3) Greater accuracy in workmanship, resulting in improved quality of product, (4) Less eye strain, (5) Working conditions more pleasant and (6) Supervision made easier.

These advantages are very real and are obtainable at a very moderate cost. The details of working out a satisfactory lighting system may be delegated to an illuminating engineer or the representative of lamp companies. The executive or manager owes it to himself, however, to see that this phase of his supervision is not neglected.

Handling Materials Efficiently

J. G. HATMAN, in *Chemical and Metallurgical Engineering,* discusses good material handling as an aid to production efficiency in its relation to buildings, equipment, personnel and the functions of management. Although applying particularly to mechanical handling systems in chemical plants, the advantages outlined are equally true of any industry where products are processed at a uniform rate.

The effect of good material handling on the utility of plant buildings is (1) that it allows fuller utilization of space for production by doing away with storage spaces between processes; (2) it lessens the amount of space devoted to the storage of new and finished materials because it feeds the work more efficiently and maintains a steady rate of production. In relation to equipment a well-designed handling system (1) feeds material at the rate at which machines operate most efficiently and (2) removes material as fast as the product is finished, preventing accumulation of material. Efficient handling (1) reduces personnel, (2) permits the employment of only skilled and semi-skilled labor and (3) takes the burden of physical labor from the worker. Management benefits in (1) the relief from detail, (2) the steady flow of materials insuring more dependable production estimates than by manual methods and (3) in the reduction of clerical, administrative and other overhead charges brought about by the greater ease of obtaining cost figures.

Testing the Workers' Mental Alertness

IN *The Journal of Personnel Research,* A. W. Kornhauser reports the results obtained from a series of mental alertness tests in business establishments. The tests were found to give results in close agreement with the ability of office workers as rated by their supervisors and with the ability of student-employees in a factory school as indicated by their success in the school. A further comparison showed that mental alertness test scores are definitely related to turnover among clerical workers. The results point to the practicability and desirability of using intelligence tests as aids in selection, classification and the study of special problems, particularly with office employees.

The test consisted of a series of six parts: (1) Arithmetical reasoning (arithmetic test), (2) Giving the opposites of words (opposites test), (3) Seeing relationships between words (analogies test), (4) Counting cubes in pictures showing figures built of cubical blocks (cube analysis test), (5) Rearranging letters to form words (disarranged words test), and (6) Solving problems of combining coins to form certain sums (coin test).

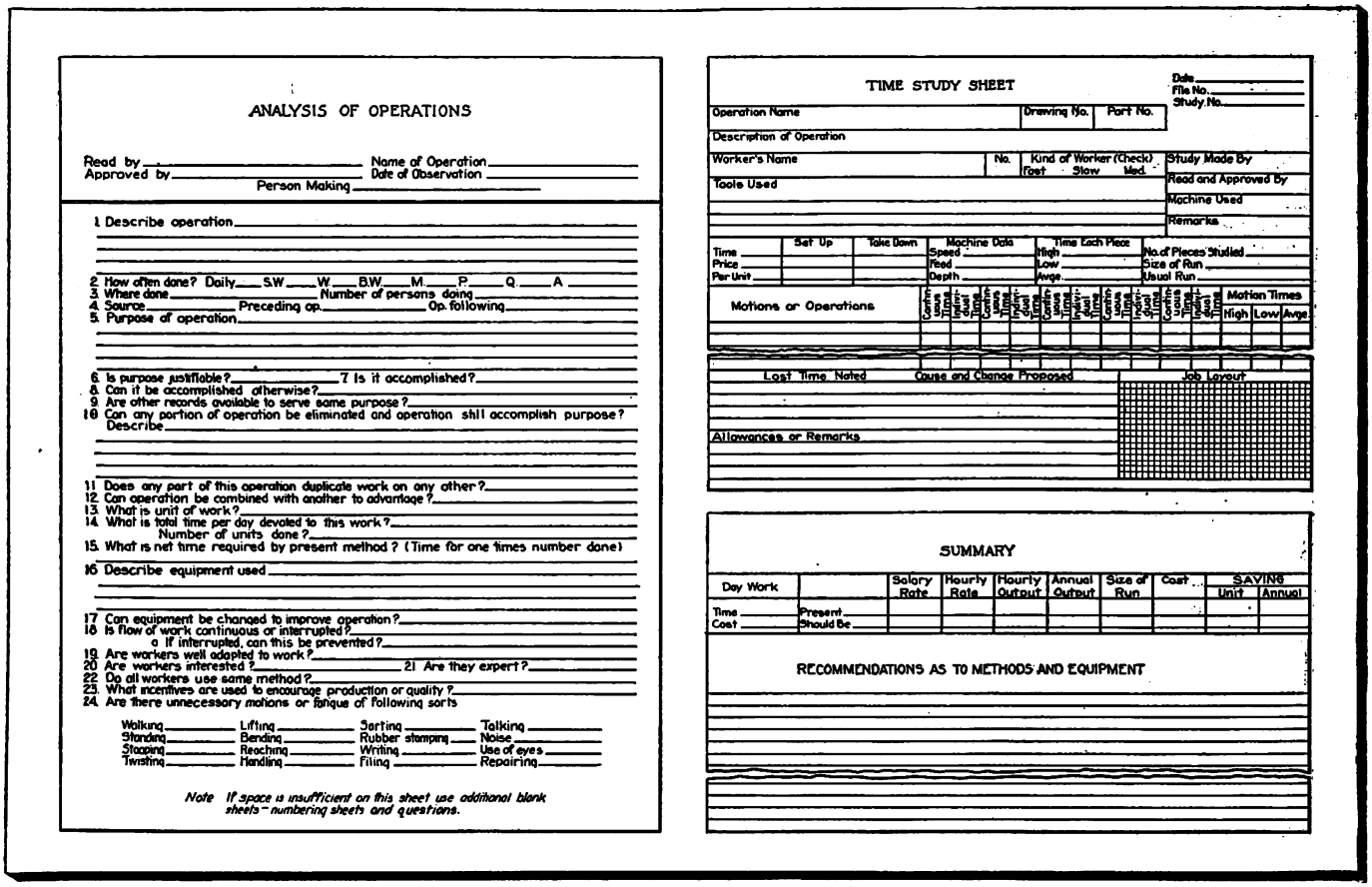
The description of mental tests tells little concerning their value. The one safe method of judging the worth of a test is to see if it works. The test aims to select people with respect to their ability for some job. The value of the test can be determined by giving it to people whose ability is known. If the test scores agree with the known abilities, the same method can be used to predict the ability of an unknown person applying for similar work.

The relation of ability to labor turnover can be strikingly shown by plotting the percentage of employees making a given test score who leave the company within six months from the time of employment. Curves of this kind call the attention of the management to conditions that merit investigation in order to prevent the loss of desirable employees. Information is obtained at the same time which is useful in specifying requirements for different occupations in terms of test scores.

How to Make a Time Study

FOR the proper application of the time-study sheet shown in the illustration the following description of how to make a time study is condensed from *100% Management.*

After all facilities and conditions have been investigated and taken into consideration as shown on the form, the investigator should advise the worker that he is attempting to find the cost



ANALYSIS OF OPERATIONS

Read by _____ Name of Operation _____
Approved by _____ Date of Observation _____
Person Making _____

1. Describe operation _____
2. How often done? Daily ___ SW ___ W ___ BW ___ M ___ P ___ Q ___ A ___
3. Where done _____ Number of persons doing _____
4. Source _____ Preceding op. _____ Op. following _____
5. Purpose of operation _____
6. Is purpose justifiable? _____ 7. Is it accomplished? _____
8. Can it be accomplished otherwise? _____
9. Are other records available to serve same purpose? _____
10. Can any portion of operation be eliminated and operation still accomplish purpose? Describe _____
11. Does any part of this operation duplicate work on any other? _____
12. Can operation be combined with another to advantage? _____
13. What is unit of work? _____
14. What is total time per day devoted to this work? _____ Number of units done? _____
15. What is net time required by present method? (Time for one times number done) _____
16. Describe equipment used _____
17. Can equipment be changed to improve operation? _____
18. Is flow of work continuous or interrupted? _____
a. If interrupted, can this be prevented? _____
19. Are workers well adapted to work? _____
20. Are workers interested? _____ 21. Are they expert? _____
22. Do all workers use same method? _____
23. What incentives are used to encourage production or quality? _____
24. Are there unnecessary motions or fatigue of following sorts

Walking	Lifting	Sorting	Talking
Standing	Bending	Rubber stamping	Noise
Stooping	Reaching	Writing	Use of eyes
Twisting	Handling	Filing	Repairing

Note If space is insufficient on this sheet use additional blank sheets—numbering sheets and questions.

TIME STUDY SHEET

Date _____
File No. _____
Study No. _____

Operation Name | Drawing No. | Part No.
Description of Operation
Worker's Name | No. | Kind of Worker (Check) Fast Slow Med. | Study Made By
Tools Used | Read and Approved By
Machine Used
Remarks

	Set Up	Take Down	Machine Data	Time Each Piece	
Time			Speed	High	No. of Pieces Studied
Price			Feed	Low	Size of Run
Per Unit			Depth	Avge.	Usual Run

Motions or Operations | Continuous Time | Time | Individual Time | Motion Times High | Low | Avge.

Lost Time Noted | Cause and Change Proposed | Job Layout

Allowances or Remarks

SUMMARY

Day Work		Salary Rate	Hourly Rate	Hourly Output	Annual Output	Size of Run	Cost	SAVING Unit	SAVING Annual
Time	Present								
Cost	Should Be								

RECOMMENDATIONS AS TO METHODS AND EQUIPMENT

Two Useful Forms for Routine Operation Analysis

The forms shown above are used in conjunction with the Schedule of Routine Operations given in a previous issue. The originals are on standard 8½ x 11 sheets, the summary being printed on the reverse side of the Time Study Sheet. See text, "How to Make a Time Study," for description of the process.

of the operation and that in order to obtain this cost it will be necessary to determine what can be considered a fair hourly production. The elements of the operation should be listed in the "Motions" or "Operations" column. With these elements noted, a continuance time study is started and with the beginning of the first operation the watch time should be taken. The watch time at the end of each operation is noted and the watch stopped at the completion of the final operation. These times are all noted in the "Continuous Time" column. After the continuous time for one piece or process is taken it can be left to the judgment of the operator how many additional time studies are necessary to arrive at a fair average. In some cases ten different timings are taken; others necessitate only one or two to arrive at a fair average.

The individual time for each element is found by subtracting the continuous time of the previous element from the continuous time of the element in question. The average of the high and low individual times is shown in the last column.

The question of allowances must be taken into consideration and the time study man must consider that allowances cover all time which is non-productive, such as contingencies and necessities of workmen, in fact any idle or non-productive time occuring during the periods of operation. The general average for allowances has been set in most cases at 10%, although there have been conditions which have necessitated as much as 20% allowances.

On the basis of this study a unit rate and cost are set up and recorded on the reverse or "Summary" side of the sheet. The taking of a time study involves attention to the minutest details and frequently data taken on the conditions of the test which may seem irrevalent at the time proves to be of prime importance when the question of allowance and an equitable rate comes up.

Correcting Faulty Rate-Setting Standards

STANDARDS are not infallible, even though set by most careful time study, says Harry K. Reed in *Industrial Management*. Insufficient maintenance of machines and ideal working conditions, changes in design which have been overlooked, clerical errors, technical errors of time study—these are some of the many reasons for standards being set inaccurately or for becoming inaccurate after being accurate.

Such standards can exist unknown to the management, perhaps. But the mere fact that bonuses are earned by performance of tasks within standard times is not proof that the allowances are accurate. When an operator meets the conditions of a generous or insufficient time allowance, his tendency is to hold out his report on the former until the allowance is consumed, in the meantime working on the job with the insufficient time.

It is hardly fair to ask the average worker to report a saving on one job when he knows for a certainty that he is going to lose the bonus on the following. The worker's point of view is that he would simply be contributing to the company treasury. The condition cannot be remedied by rules and penalties, especially when the foremen depend upon the shop bonus for their bonus. Such methods merely place a premium upon the cupidity of the employees.

The practice can best be eliminated by correcting these items: first, those on which the standards are too low; and after the operators are confident that a sincere effort to keep standards nearer an ideal condition is being made, the standards bearing too much time may be adjusted. It is not an exceptionally difficult thing for an experienced time study man or rate setter to discover and remedy this condition, provided he is permitted to make his decisions independently of past performances.



Automotive

ALTHOUGH a decrease was registered in every classification of the July automotive exports from the United States, with the exception of motor boats and airplanes, there was an increase in the unit values in all cases. Passenger-car exports during July decreased 28.4% in number, and 24.4% in value, from the exports during June, 5,600 have been exported at a value of $4,395,541. The unit value of $784 covered an increase of $42. The least decrease was shown in exports of cars valued between $800 and $2000. The smallest decrease in trucks was in those of medium price. The unit value of this class increased $487, while that of trucks over 2½ tons capacity increased $635.

Cereal

IT is predicted that the volume of corn exports in 1922 will be the largest on record since the 1896-1900 period, when the average was 176,470,000 bushels annually. In 1922 the exportation of corn for the first six months was more than 105,000,000, or about 16,000,000 bushels a month, which is at the rate of 192,000,000 for the year. The largest buyers in 1921-1922 were Canada, Germany, United Kingdom, and Mexico.

Chemicals

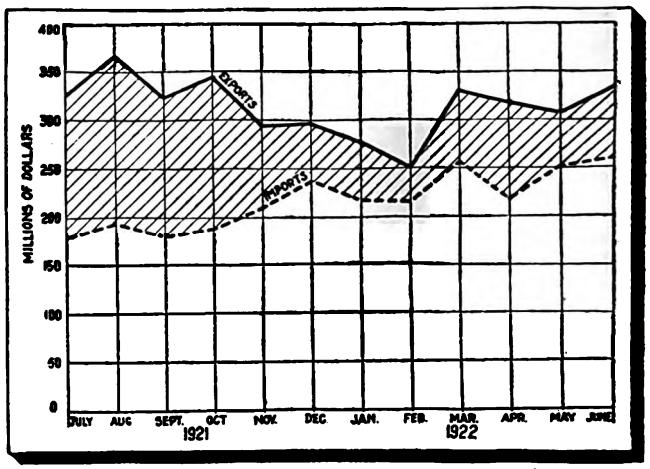
EXPORTS of chemicals and allied products from the United States for the seven months, January-July, 1922, amounted to only $63,113,990, a drop of over $2,000,000 from the value in the corresponding period of 1921. The principal decreases were in soda ash, pigments, paints and varnishes, fertilizers and coal-tar products. Increases were noted in wood alcohol, acetate of lime, calcium carbide, chloride of lime, copper sulphate, caustic soda, zinc oxide, ammonia sulphate rosin, and spirits of turpentine.

Electrical

THE latest trade promotion effort of the Department of Commerce is that of informing American business men by radio as to foreign sales openings in order to secure an advantage over their competitors for the world's markets. Inquiries for American goods coming into the Bureau of Foreign and Domestic Commerce are now distributed to New England manufacturers and merchants through the air by the Bureau's Boston office, in collaboration with the broadcasting station at Medford, Mass. It is believed that selling American goods in foreign markets through the help of ether waves can be extended to other parts of the United States.

Fuel

DURING a recent week 26 steamers arrived in New York with 160,985 tons of British coal, in comparison with average weekly arrivals of 88,935 tons in August. Imports of coal in September for all United States ports is expected to go well over 700,000 tons, compared with the August estimated total of 375,000. The total for July was 189,940 tons and for June 135,407 tons.



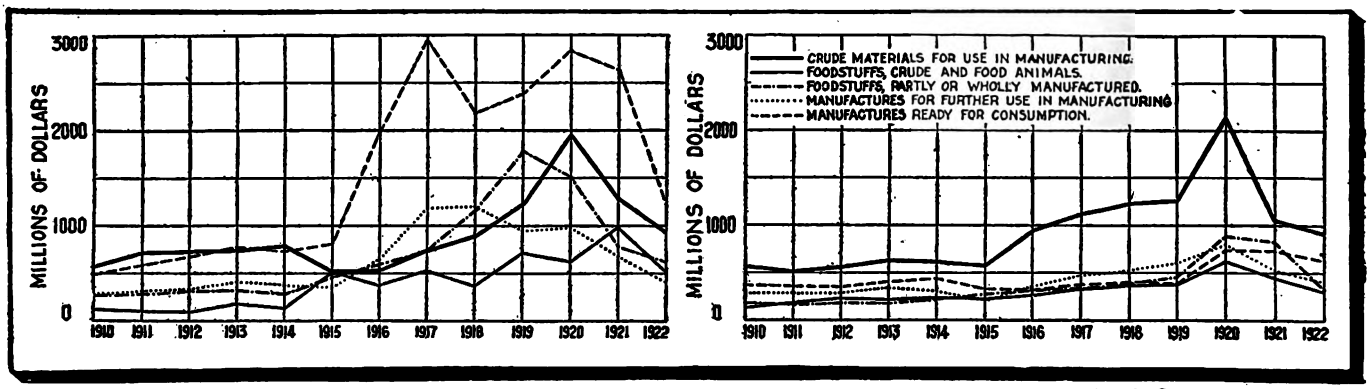
Total monthly imports and exports of U. S. for the fiscal year 1921-1922.—*(U. S. Commerce Reports.)*

Iron and Steel

IN the opinion of *Iron Trade Review,* the decreased exports of iron and steel are the reflection of the fuel and transportation situations in the United States. Exports of mill and furnace products during August dropped to the lowest point since February, and rank the lowest of the year. Imports made their fourth successive monthly gain and stand at the highest point since November, 1920.

Lumber and Wood Products

WHILE the July exports of softwoods showed a sharp decline, especially in the case of fir lumber, hardwoods continued their upward trend. Shipments of oak lumber totaled over 10,000,000 feet, and gum 5,000,000. The total exports of all sawn lumber amounted to 116,000,000 feet, a drop of nearly 37,000,000 feet below those of June, which makes July the lowest point for the year. Douglas fir lumber exports



(U. S. Commerce Reports)

Exports by great groups (fiscal years 1910-1922). **Imports by great groups (fiscal years 1910-1922).**

to Japan have declined to but 12,000,000 board feet, while China took over 14,000,000. For Southern yellow pine, the chief board, plank, and scantling markets for July were Argentina, Cuba, Mexico, and the West Indies.

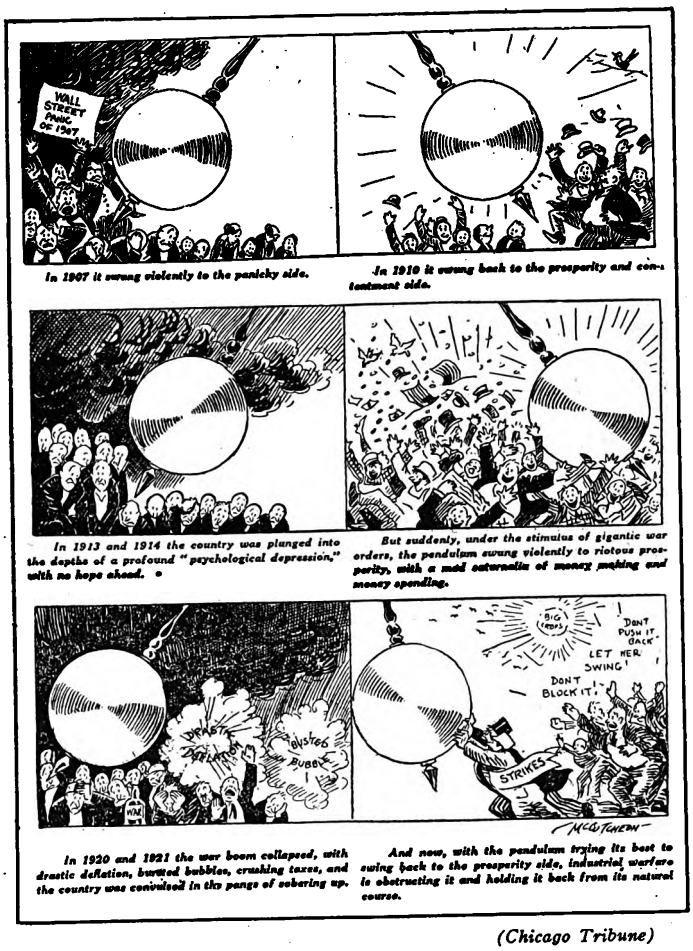
Metals

AN increased demand for lead is noticeable in both domestic and foreign markets. Consumers are reported to be finding it difficult to fill their requirements. In a recent week the lead exports reached a total of 264 tons. Trading on the London Metal Exchange for this same week totaled 1,550 tons on spot and 1,350 tons of futures.

Prices of tin are being forced up by the scarcity of the metal. Trading in the London market for the past week totaled 1,250 tons of spot and 3,700 tons of futures. There have been practically no recent exports of zinc from the United States.

Mining

ON account of the increasing seriousness of the situation in the Near East, the foreign market for copper has been quieter recently. The chief buyers have been England, Germany, France, Sweden and Italy. The Copper Export Association has been the big seller.



(Chicago Tribune)

The U. S. business pendulum.

Oil

FOR the month of July, the volume of United States exports of each of the chief petroleum products, with the exception of gas and fuel oil, showed large increases over those for July, 1921. Substantial increases were noted in crude oil, gasoline, lubricants, and paraffin wax. Exports of crude oil were 64% above those for July, 1921. Shipments of lubricating oils were 59% greater than last year. The declared export prices for July, 1921, averaged 30 cents per gallon, and for July, 1922, 23.4 cents. Exports of paraffin increased 42% over July, 1921.

Paper

THE paper industry in the United States seems to be recovering. While it is regarded as unlikely that exports during the current year will reach the volume attained in 1919 or 1920, it is predicted that they will greatly exceed those of 1921. The outlook is most encouraging for manufacturers of newsprint and wrapping papers. Shipments of newsprint, which in 1921 amounted to only 16,812 tons, or only 1.4% of the total production, have, during the first half of 1922, reached 14,987 tons, or 2.3% of the total production. Shipments of wrapping paper during 1922 equaled 2.3% of production, as compared with 1.8% in 1921 and 0.8% in 1913.

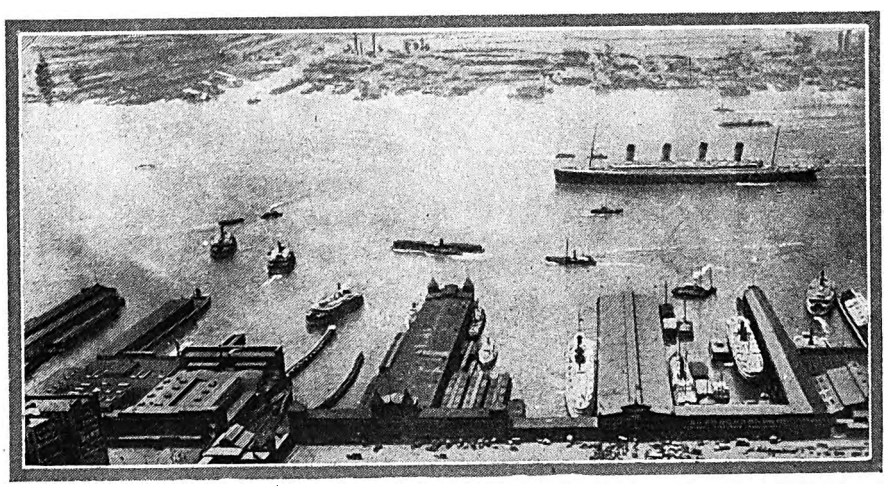
Textiles

ALTHOUGH export trade in textiles is still lacking in activity, this is thought to be the reaction from the heavy buying during April, May and June. Business will probably be fairly quiet until stocks are partially exhausted. In some instances, of course, advanced prices are responsible, but in most cases demand is largely dependent upon local economic conditions in the various foreign countries.

It is reported that in a number of markets American prices are so much higher than British goods that the latter have had the preference. According to *Textile World*, competition with Manchester, England, is very keen, notwithstanding the fact that certain goods made by mills in this country cannot be produced by British mills.

Transportation

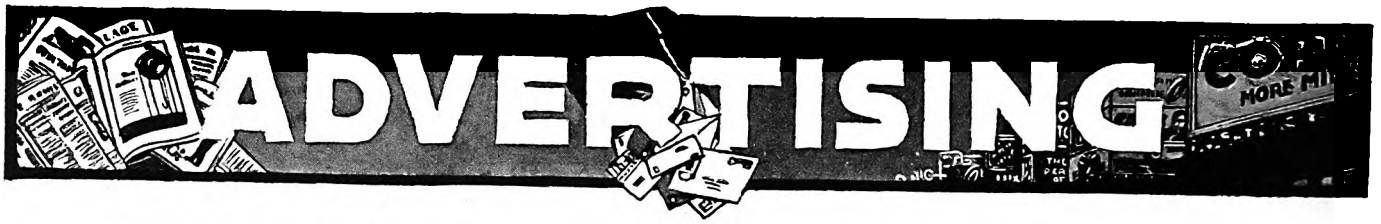
RAILROADS west of the Mississippi have reduced export rates on certain commodity shipments from Chicago, St. Louis, St. Paul, Minneapolis, Omaha, Kansas City, Denver and related points to San Francisco and Seattle, destined to points on the west coast of Central and South America. Among the commodities affected are: Automobiles, agricultural machinery, paper products, steel products, canned goods and railroad equipment. The largest decreases in shipments abroad have been made in the automobile and agricultural machinery industries.



Waterfront at New York—loading ships for export.

Rubber

THERE has been little improvement in the demand for crude rubber from foreign sources during the last few weeks. The price for spot sheets and crepe remains unchanged in the London market and authorities believe there is no immediate prospect of an increased demand abroad.



Dramatizing the Argument

ONE of the chief difficulties encountered in the selling of a technical product or service to industrial concerns, says Roland Cole, in *Printers' Ink,* is getting the proposition before the right man—the man who has authority to pass on it. A second difficulty is puting the proposition before that man so he will see it from his own point of view. This is accomplished by the Grinnel Company by dramatizing its sales campaign in order to attract inquiries from the desired class of prospects. This company has a story to tell that reaches beyond the authority of the average purchasing agent and challenges the consideration of the higher officers. The presentation of the story offered difficulties of many kinds. The company did not wish to draw inquiries from people who had no active interest in piping installations.

Industrial piping, whether for sprinkler systems, dryers, heating or for conveying liquids or gases through pipes, interests the president of the company, the production manager, the consulting engineer and the plant engineer. Each advertisement must be written so as to attract the attention and clinch the interest of all four classes of people, although each would be concerned with a pipe installation from a different side.

The problem was solved by devising a series of dramatic situations, each involving a cast of four characters and making a one-act play of each situation. The material for these little dramas revealed itself in the daily work of the company's sales force and traveling crews, and subjects have proven to be quite inspirational.

For example, a large manufacturing plant had an accident in its boiler room. The main steam line blew up and put the engine out of commission. Investigation showed that a pipe hanger had given way and allowed a pipe to sag, and this caused an accumulation of water in the main steam line which burst when steam was turned on in the morning. Out of these facts a dramatic advertisement was constructed. The "big moment" is pictured in an illustration showing a portion of the wrecked boiler room.

Four characters occupy the stage, each "caught" in a dramatic attitude — the president, the consulting engineer, the production manager and the plant engineer. The text of the advertisement is presented in the form of dramatic dialogue.

It is pointed out that there are like opportunities in advertising other products. Dramatic material is everywhere present in what has to do with human needs.



(Kansas City Star)

And they say government management is inefficient.

Advertising Parts Sells Whole

ADVERTISING is being used for a new purpose in the leather industry. One of the most interesting developments along merchandising lines in the shoe trade, says *Class,* is the emphasis which is being laid by shoe manufacturers upon the various component parts of their products—leather, counters, linings, etc.:

"This is largely due to the fact that manufacturers of shoe materials and parts have been aggressively advertising to the whole trade, including retailers and manufacturers, the advantages of their products, with the result that these trade names have come to have a definite significance.

"In fact, the advertising of shoe parts and materials has advanced to such a point that retailers are specifying these products in ordering shoes. Thus the advertising is having a reaction that is producing business for manufacturers whose sales are made to the retailers only indirectly.

"The situation is comparable to that in the automotive field, where manufacturers of parts entering into the construction of cars have made their products so important in the eyes of the dealer and user, through advertising, that the product is featured by the car manufacturer in offering his line for sale."

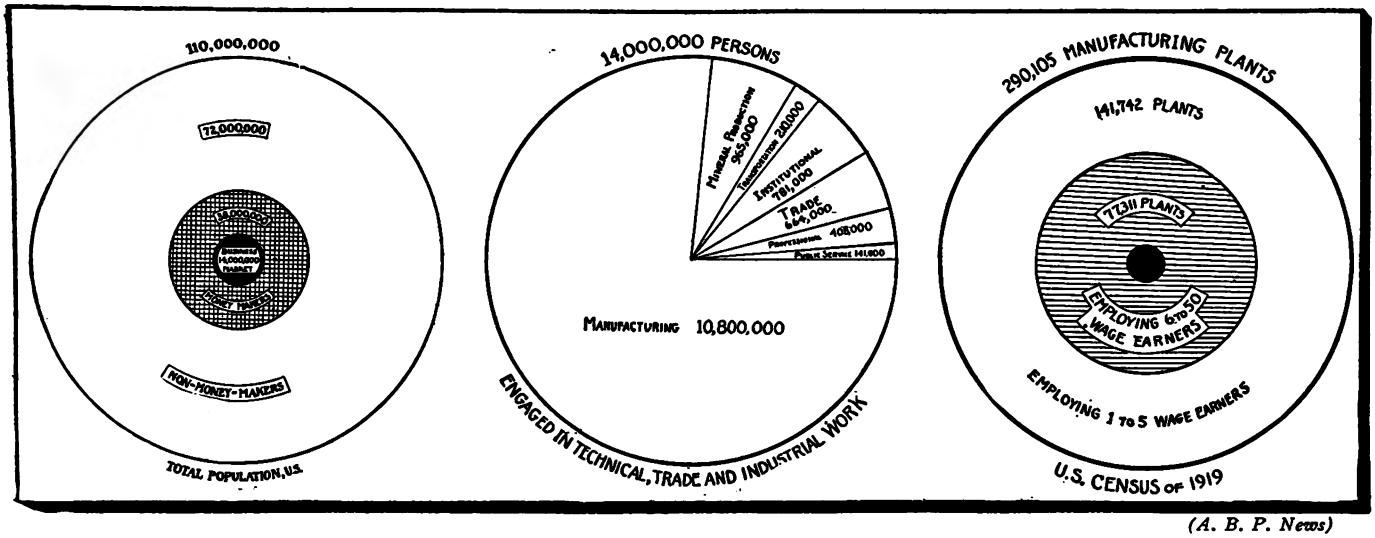
Too Much Cooperation?

THAT exclusive sales cooperation may be resented is pointed out by Charles F. Pemberton in *Class.* He questions whether manufacturers in some lines are not spending too much effort to help dealers sell and calls attention to the discussions now going on in the farm implement field between two groups of manufacturers, one representing the house of the International Harvester Company type, which supplies factory canvassers and many other retail sales helps, and the other the Moline Plow Company type, which believes too much is being done in this direction. The contention of the latter is that high costs of distribution are largely chargeable to this excessive zeal on the part of the manufacturer in helping the retailer to sell. The Moline Plow Company has been the poorest advertiser in the farm implement field. Is it possible that this has something to do with the matter.

The question is where dealer cooperation should stop, and it is believed that the discussion in the implement field will be interesting, at least in suggesting some of the dangers of too great effort in this direction.

According to George N. Peek, of the Moline Plow Company, it is difficult for the dealer to attain a standard of real service to his community if—

"Through an undermining species of 'cooperation' he is robbed of his initiative, his incentive, and his independence.



(A. B. P. News)

Illustrating the relative size of the business market, the general market, and the present entire population of the United States.

An analysis of the business market on basis of occupation, showing number of persons in each major division; taken from 1920 census figures.

The relative number of small, medium and large manufacturing plants. The black area represents the number employing over 50 wage earners.

He cannot. Give him the responsibility for retail distribution, and he will fulfil that responsibility in a manner that will serve his community and profit the manufacturers. Deprive him of that responsibility, and both his community and the manufacturer will suffer.

"There is another vice inherent in such 'cooperation' which should not be overlooked, and that is the duplication in distribution cost, which of course goes into the price of the product and is paid by the ultimate purchaser. The good dealer earns a fair profit as compensation for service rendered to his customers. But it is not earned if he fails to render that service, and it is not earned if someone else attempts to render the service for him. The latter case results in a double charge for distribution."

* * *

Art, copy, mediums are merely tools, tools which are two-edged, that can cut both ways.—Advertising and Selling.

* * *

The Political Space Buyer

DISCUSSING the possibilities which the political campaign offers to the seller of space, Roy Dickinson, *Printers' Ink*, points out that there was a time when stunts and free publicity were considered all that was necessary to elect men to almost any office from dog-catcher to Governor. But in the last six or seven years political advertising has, to a large extent, supplanted the old familiar political stuff. It is beginning to be recognized that the eloquence of the editorial columns of a party paper in behalf of its political candidate not only is harmful to the newspaper but carries little weight with the public. Then, too, the office-seeker who is trying to offset the attacks of an opposing paper, can do so *only* through paid advertising in that paper. Paid space is now being used to sell the capabilities of the candidates to the voters. Citizens are refusing to respond to any of the old conventional devices to arouse enthusiasm. The writer says:

"It is safe to say that in no field of modern advertising are the possibilities for unusual angles and new appeals so apparent. Pary issues when discussed at ward meetings or county committees are dry and uninteresting subjects. Rewriting them in the vernacular and thus reaching the great multitude of people, is a far better method than the old-fashioned 'free publicity' and stunts. A very small majority of the silent vote attends ward meetings or political rallies and those that do represent but a small portion of the voters. Every possible voter can be reached through some form of advertising. By the very logic of its case advertising is going to play a greater part in merchandising men and principles."

* * *

Advertising is never an expense. It is either a form of waste or an economy.—James O'Shaughnessy.

The Business Market

IN discussing the buying power of business, the *A. B. P. News* states that while it would be impossible to gather exact figures on the annual purchases of all the varied buyers in the business market, it is not at all necessary to go to such lengths to find facts and figures which give a clear indication of the buying power of industrial, trade and class purchasers.

Perhaps the best single index of the buying power of the industrial plants of the country is the tabulation of the value of the output of these industries. The annual value of the products of our factories is shown in the following table:

Industry	*Value of Products*
Food and kindred products	$12,438,890,851
Iron and steel products	9,403,634,265
Textiles and their products	9,216,102,814
Miscellaneous industries	6,180,255,709
Chemicals and allied products	5,610,299,073
Vehicles—land transportation	4,058,911,515
Lumber and remanufactures	3,070,072,813
Paper and printing	3,012,583,990
Other metal products	2,760,293,568
Leather and finished products	2,610,230,727
Railroad repair shops	1,354,446,094
Stone, clay and glass products	1,085,528,926
Tobacco manufactures	1,012,933,213
Liquors and beverages	603,895,215
All industries	$62,418,078,773

* * *

The prime factor of a successful advertising man is imagination.—Maurice Switzer, Printers' Ink.

* * *

Make Your Letters Talk

A KNOCKOUT for "Dear Sir" and "Very truly yours" is scored by Wesley E. King in the *Mailbag*. He satirizes their use by saying that Mr. John President, or Mr. Jim Manager, seats himself comfortably and dictates "Dear Sir—We are in receipt of your letter of recent day and in reply beg to state that, etc., etc.—Very truly yours."

It is pointed out that there is not one little bit of kick in that letter of 20 or 40 words. No man, it is asserted, would walk into an office and say "Dear Sir." And it is pointed out that letters were originally invented to take the place of personal interview. To be effective it must have much the same personal touch. Not only should a letter talk, not only should it be cheerful and interesting in the same way that a conversation might be, but it should have on the right kind of a necktie, shoes and suit of clothes. A sales letter must have, and any letter should have, unexpected stops, so that its force may be broken and monotony avoided.



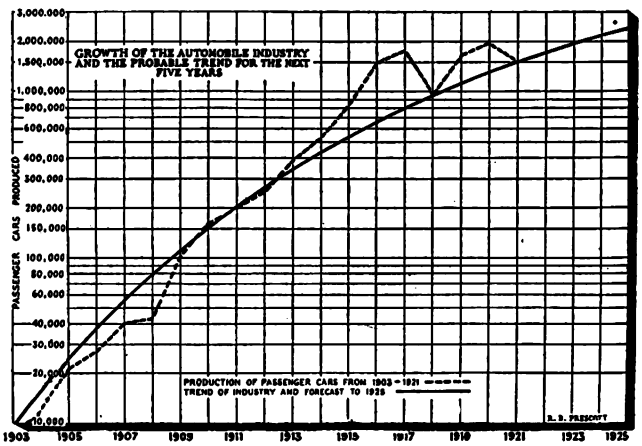
Prospect for Automotive Industry Good

IT is estimated that production of automobiles for the first eight months of 1922 is likely to equal the entire year of 1921. *Automotive Industries* believes that America has learned the economic value of the motor vehicle and for that reason there will not be any bottom to the market. There are a good many millions of potential purchasers who have never owned a car, and in addition there is an enormous replacement market. The prospects for the next five years are indicated in the chart below.

While it is true that production will not continue for the next four months as it has in the past four, it is encouraging to note that there has been no midsummer slump. Preliminary estimates of the National Automobile Chamber of Commerce show a total output for August of approximately 280,000, which closely approaches the record of 289,000 set for June. The total production of the industry for August, 1921, was only 180,000 cars.

It is predicted that business is going to be very good for the latter part of the year. The demand for closed models is said to be strong, and it is believed the market for this type of car will be stimulated by the closed-car shows which dealers all over the country are now planning.

Some Problems in Automobile Finishing. Problems are many and highly technical, but author selects that of varnish alone and follows this through preliminary steps of preparation and manufacture to final use. In this he takes up the minor problems which crop up all along this line. He compares short and long oil varnishes, gives results of exposure tests, compares blue and green color varnishes, and takes up many similar topics. L. VALENTINE PULSIFER. *Automotive Manufacturer,* 8-22, 2750 w. MAH.



Forecasted probable trend of the automobile industry based on its growth since 1903.—*(Automotive Industries.)*

Preparing Automobile Bodies for Paint. Author states two most important steps in preliminary work are preparing the surface and applying the first coat; that is, cleaning and priming the body. He proceeds to develop this idea in considerable detail. W. C. DU COMB, JR., *Automotive Manufacturer,* 8-22, 2600 w. MAH.

Manufacturing Automobile Body Panels. Materials used for metal body panels, and types of presses used to form them. Production of dies for body panels, and advantages of large, heavy machines in a heavy production schedule. Views of machines used and records of their performances. Single and double action presses. Some notable large machines and their work. GEORGE J. MERCER, *Automotive Manufacturer,* 7-22, 1950 w. MAH.

Better Automobile Insurance. Detailed summary of the various branches of the industry with pertinent suggestions. Collision insurance not profitable to companies. Other forms permit an even break at least, collision shows a loss. Driver a great factor in liability. Human life valued higher and this is now added to the cost of insurance. A. R. SMALL. *Accessory & Garage Jour.,* 8-22, 4000 w. MAH.

Comment on Motor Bus Design. The title tells the scope of the article. The author is chief engineer of the Fifth Ave. Coach Co., New York. His comments on existing bus designs should be of great interest to the trade. G. A. GREEN, *Power Wagon,* 8-22, 7000 w. MAH.

How Trucks Can Serve Railways. The general manager of the Erie Railroad tells how motor truck operation can be substituted for present-day railroad operation in short branch-line operation, trap-car service, suburban distribution, utilization of outlying yards in lieu of yards in congested city districts, and in terminal distribution. He develops the argument for each of these five classes of service. R. S. PARSONS, *Power Wagon,* 8-22, 2200 w. MAH.

Eighty-eight per cent of all the automobiles in the world are in the United States and Canada.—*Dearborn Independent.*

How Motor Transport Was Saved in England. British railroad feeling pinch of truck competition attempted legislation which would give them a monopoly. Truck manufacturers, road transport companies, general industrial organizations (those owning trucks and those employing transport companies wholly or in part) combined and successfully fought the monopoly. American truck manufacturers can profit by this experience through application to home conditions, as well as through greater truck sales possibilities in Britain because of the successful fight. M. W. BOURDON, *Automotive Industries,* 8-31-22, 2300 w. MAH.

New Process of Manufacturing Truck Wheels. New process of Bethlehem Steel Co. in which wheels are produced rapidly from steel beams which have been rolled out previously. The beam is blanked out so that parts of the web left have the shape of flat spokes. Fourteen of these are left, and then are staggered by offsetting the ends. This is then rolled up into a circle, machined at the center and the hub core inserted. The felloe is welded, making it a permanent circle, after which the outside is machined to take the tire. The wheels are made from a special I-beam with a flange equal in width to the desired final width of the wheel surface, and a pair of wheels are made side by side from each length of beam. *Automotive Industries,* 8-10-22, 1500 w. MAH.

Reducing Size of Combined Ignition and Lighting Systems. Consideration of available apparatus for motorcycles, and the advantages and disadvantages of each. Suggestions from European practice. Innovations not always practical. Some successful magnetos which have not been redesigned since 1910. Wide range of practice. Five possible combinations are cited by the author, who also gives the comparative advantages that can be expected of each combination. FRED J. HOFFMAN, *Automotive Industries,* 8-31-22, 1400 w. MAH.

Testing Spark Plugs. An account of the work being done by and at the Bureau of Standards along these lines. Apparatus specially developed and its influence on the progress of the work. Hundreds of plugs of all styles, types, sizes and materials tested. Manufacturers have been aided by the use of the data obtained, and as a result are now making better plugs. HUGH G. BOUTELL, *Automotive Manufacturer,* 7-22, 950 w. MAH.

New Foundry Process Secures Uniform Cylinder Bore Hardness. Description of foundry process in which metal-faced cores are used to produce a cylinder bore of uniform hardness throughout its length. Uniform crystallization is obtained by use of metal-faced cores. Reduction of 75 cents per cylinder claimed over sand core method, in addition to easier and more uniform machine work, and a more uniform, more desirable finished casting. Data of new process. *Automotive Industries,* 8-31-22, 1050 w. MAH.

Actual Running Costs of Motorships. This is second and concluding instalment of a set of figures just released by a large and prominent Swedish ship-owning company, which has recently ordered additional motorships. Two of this firm's motorships carry crews of 13 and 16 men respectively, as compared with one of the firm's steamers which carries 18 men. The latter had oil-fired boilers, so was an exceptional type. At that, it had to carry some 1400 tons of coal for one boiler. This was in addition to the oil carried for the boilers and consequently occupied just that much of what is paying cargo space in the motorships. Many general figures are given on the performance of the two types. TADGE MADSEN, *Motorship,* 9-22, 2600 w. MAH.

Conservation of Motor Fuels. Statistical study of need for liquid fuel and future supply of motor fuel. Best method of conservation is to increase efficiency of automotive equipment. One solution lies in changing gear ratio in rear axle so that rear wheels make greater number of revolutions per revolution of motor than they did before. Not practical solution. Next step is to increase expansion ratio of engine. This has disadvantage of producing "knock." Overcome by so-called anti-knock compounds, some of which are very effective. These have no effect upon power obtained from fuels and have been used effectively in aircraft motors. T. MIDGLEY, JR., and T. A. BOYD, *J. Ind. Eng. Chem.,* 9-22, 2500 w. CJW.

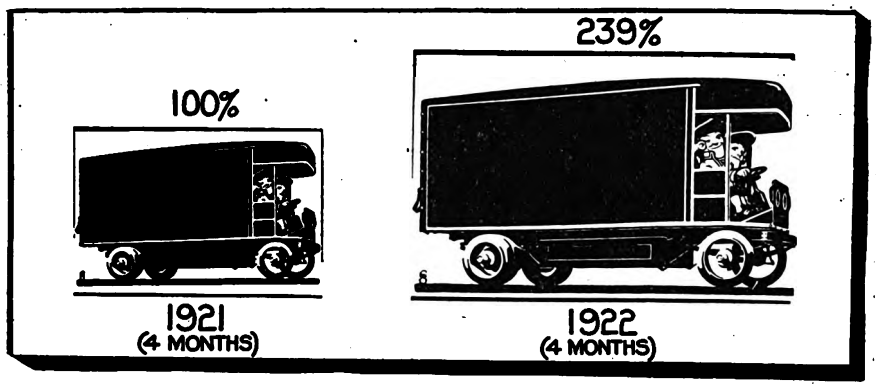
How to Prevent Oil Pumping. Piston ring fit and oil grooves are important factors. Oil pumping is the passing of the oil into the combustion chambers of an internal combustion engine at a greater rate than it can be burned cleanly by the fuel charge. Amount of oil burned without trouble in any engine depends somewhat on the character of the oil, but chiefly on the load factor and the correctness of the mixture. Various other controlling factors are explained in detail, with particular reference to passenger car service. To assure good lubrication and to offset the effects of dilution it is desirable to renew oil in the crankcase at reasonably frequent intervals. Amount of oil passing an engine piston in a given times depends on (1) the amount of oil thrown to the cylinders, (2) number of piston strokes, (3) efficiency of the means for piston drainage, (4) the ring fit, (5) the oil viscosity and character, and (6) the vacuum in the cylinder. Various methods of piston grooving and piston-ring design are mentioned and the effect of changes illustrated. The relative advantages of the splash and the force-feed systems as affecting the development of oil-pumping troubles are set forth and improvements suggested. New device for reducing oil-pumping dilution troubles is described and illustrated. Vacuum is created in the crankcase. It is concluded that lubrication requirements of engines, particularly in passenger cars, do not demand the volume of oil supplied by force-feed systems. Oil-return grooving is desirable in all cases. More rigid inspection of piston rings and greater care in fitting them on pistons will remove common cause of oil pumping. G. A. ROUND, *Oil News,* 8-20-22, 6000 w. IG.

Factors Affecting Engine Oil Consumption. All too little attention has been given to the matter of oil consumption but now that economy is an important factor, some thought is being given this subject. This article represents the tests and conclusions therefrom by the Continental Northway Motor & Mfg. Co. It appears that oil consumption may vary as much as from 860 m.p.g. at low engine speeds to 92 m.p.g. in the same car on the track at 40 m.p.h. In other group of engines tested, the variation was from 0.00143 to 0.01470 gal. per b. hp. hr. or approximately 1000%. Author next conducted tests using different forms of rings, different numbers and different ring combinations on the piston. Author finally concludes that the number of rings is unimportant, although expressing a personal preference for three or two; the so-called scraper ring at the bottom of a piston is useless; the slot in the rear of the ring is unimportant; drain holes are essential, an angular-faced ring is beneficial; proper mechanical fit between the ring and the groove is essential, and oil relief holes in the rear groove are beneficial where side-clearance occurs. A. A. BULL, *Automotive Industries,* 8-10-22, 2500 w. MAH.

Gasoline Recovered from Still Vapors. In order to obtain all the possible recovery from the oil as taken from the ground, refiners are now collecting the vapors after passing the condensers and by submitting these to additional compression and subsequent cooling are obtaining additional gasoline of a high quality. The article describes the general scheme, the details of the process, the results obtained, and gives additional material and data on this general subject. D. B. Dow, *Automotive Manufacturer,* 8-22, 3750 w. MAH.

A new airplane muffler has been perfected in Europe which does not reduce the efficiency of the motor. Silent flying has now become a fact after 18 years of effort by engineers.—*Dearborn Independent.*

The extremely high cost of transportation of gasoline into the interior of the Belgian Kongo, largely due to tsetse flies, which make it impracticable to use animals for transporting goods and necessitate the use of native porters, led the Belgian Colonial Ministry to organize a trial of road tractors using palm oil as fuel. The results of these trials gave full satisfaction. The semi-Diesel two-and-four cycle engines ran normally on the palm oil, and the power developed was equal to if not greater than that obtained with kerosene. Nothing was noted that suggested possible difficulties in using palm oil in these engines. Starting up, without gasoline injection, was good, and there was no carbonization. *The Accessory and Garage Journal.* WLC.



Percentage of increase in electric truck sales in the New York district.—*(N. Y. Edison Co.)*

A new gas has been developed for aerial navigation. It is called currenium and costs $100 a thousand cubic feet less than it costs to produce helium. It is non-inflammable and non-explosive and has a lift about the same as pure hydrogen.—*Dearborn Independent.*

Accelerated Aging Tests for Rubber Tires. A method which has been developed by Goodrich engineers described and results outlined. Test is useful in comparing compounds of same general type. Rapid deterioration usually due to over or under cure, usually over cure. Test has had important results in indicating the proper cure and bringing about longer-lived tires and other rubber goods. *Automotive Industries,* 7-27-22, 1300 w. MAH.

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BUILDING·CONSTRUCTION

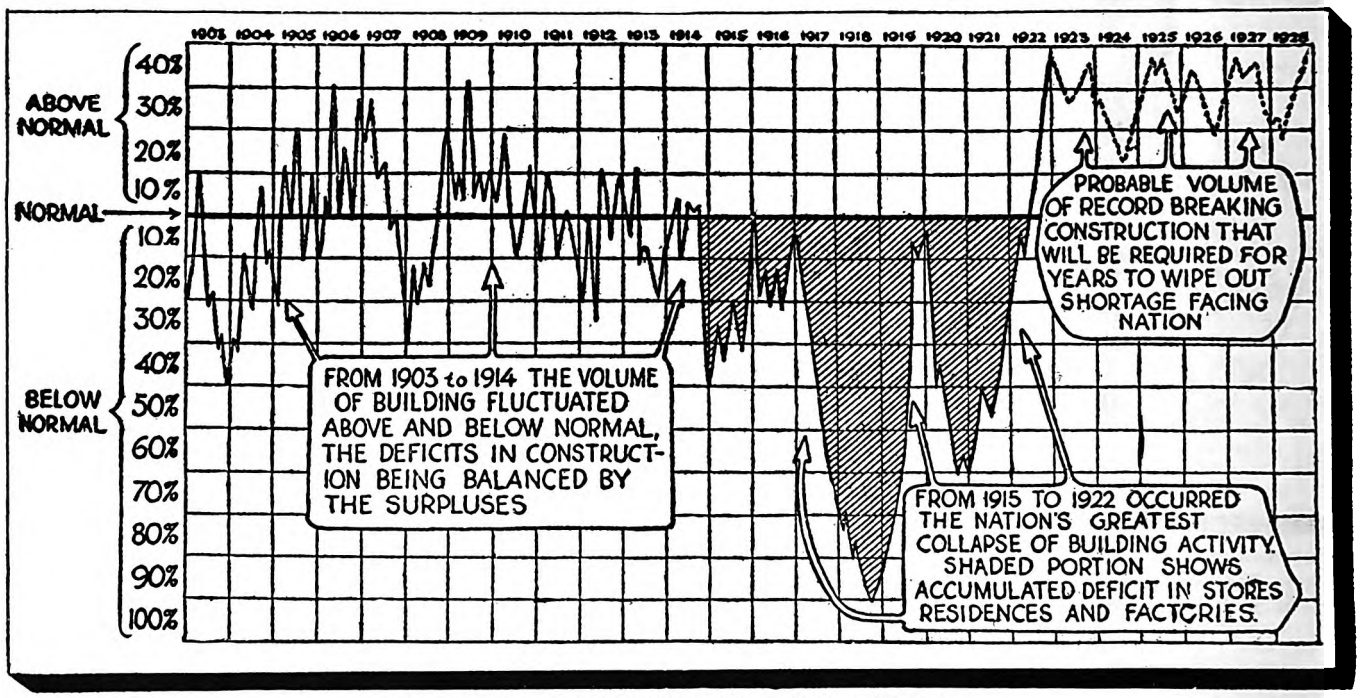
Building Shows Steady Gain

THE outlook for building is considerably improved as the result of the change in the priority ruling, which has made the burden of the car shortage less drastic to the construction industry. *Building Age* points out that although in the past September has been the month of finishing up the jobs on hand and preparing for the winter, August is the best month of the year for securing new contracts. A steady pace is being maintained, according to reports from all sections.

The important part that labor plays in the building industry is well illustrated by the fact that in Los Angeles, where there is reported to be complete peace among the building trades, the building boom is relatively more pronounced than in other large cities. For the first six months of 1922 Los Angeles stands third in amount of building permits issued, leading Philadelphia by over $7,000,000. In many sections in the East the shortage of building labor is necessitating the payment of a premium of 15% to 25% above the official wage scale.

According to *Engineering News-Record,* the construction cost index number is 12 points higher for September than for August, due to the continued stiffening in prices of steel and lumber and the recent advances in cement and labor. It is estimated that construction cost is only 2% cheaper than a year ago and 32% under the peak; it is 85% above the 1913 level.

The danger of high prices is pointed out by Franklin D. Roosevelt, president of the American Construction Council, in a recent letter to trade associations. He says that if construction activity is to be kept steady and stable for the next five years (the need for which is shown by the accompanying chart), sky-rocketing either in price or wages must be avoided.



The Nation's $2,000,000,000 Building Deficit

Two billions of dollars is the valuation placed by economists upon the stores and residences that should have been constructed to provide for the country's normal development between 1914 and 1922. The chart, based on the building permits issued the last 20 years in a score of the largest cities, indicates how nearly the country approached complete building stagnation. In 1918 the curve approached closest its base line. With construction at almost 90% below normal, the country was supplying a little more than a tenth of the buildings it needed. Economists are finding that most business and industrial activities move in cycles. From an examination of records it appears that normal and sub-normal periods are followed at regular intervals by "boom" or "peak" years. The chart shows how true this "law of cycles" is of the building trades. Beginning in 1903 we note the "peaks" in 1906, 1909, 1913, 1916, 1919 and 1922. They recur regularly at three- or four-year intervals. The phenomenal building activity now sweeping the country could have been predicted three years ago. In future years it is not to be expected that the line will fall to any great extent. However it may fluctuate, it must remain in the area of abnormally high activity. From 1903 to 1914 it rose and fell without wandering far from the normal line. Surpluses balanced deficits, and no appreciable shortage could accumulate.

—(New York Times)

House Building Industry as Seen by an Engineer. Fundamental problems in building houses can be given as: (a) securing building lots, (b) financing, (c) plans, (d) labor and materials. Covers each division. Claims more co-operation needed among architects, engineers, builders and realtors. Gives vision of future house-building in large groups. W. H. HAM, *National Builder,* 8-22, 1500 w. CS.

Effect of Obsolescence on the Useful and Profitable Life of Office Buildings. Covers various causes effecting obsolescence, based on information relating to 155 buildings in 40 leading cities. Very comprehensive article, covering effect of age, growth of business district, shifting of districts, effect of newer buildings, type of construction, elevators and mechanical equipment, etc. Gives as probable future type building built primarily as an investment and designed not only for efficiency of layout to produce greatest gross income, but also for economy of operation to give lowest operating cost. EARLE SHULTZ, *Bldgs. & Bldg. Management,* 8-7-22, 5000 w. CS.

Building the Highest Dam in Europe. Description of Camarasa hydro-electric development in Cataluna, Spain. Built at high speed during recent war. Dam

333 ft. high with gravity section of sand-cement concrete, developing 88,000 hp. WILLIS RANNEY, *Eng. News-Record*, 8-17-22, 5000 w. CS.

Architecture of Schools. Discussion of problems of architect in designing school building, covering old and new ideas, costs, materials, location, with special reference to tendency of modern practice. WILLIAM C. HAYS, *Arch. Forum*, 8-22, 2500 w. CS.

Financing Home Building. Different sources of obtaining building capital discussed, showing that the building and loan associations are vital to the building industry. K. V. HAYMAKER, *Building Age*, 9-21, 1800 w. CS.

How We Find Actual Cost of Building. Continued from previous issue, giving illustrations and uses of cost forms for work of mason, carpenter, painter, mason foreman, and summary form. LEWIS BOWMAN, *Building Age*, 9-22, 2000 w. CS.

Steel Lumber Developed for Buildings. New light sections ideal for dwellings and light occupancy buildings. Future assured by its own qualities and dearth of lumber. Gives several illustrations of use in large buildings. GILBERT CANTERBURY, *Iron Age*, 9-14-22, 2500 w. CS.

Control of Asphalt Pavement Construction. Covers plant control; testing, use of sand, drying and heating, use of pyrometers, proportioning, visual inspection, transportation; and control of road: weather conditions, concrete base, dumping and spreading, spreading seal coat, rolling, compression, joints, finishing. E. R. OLBRICH, *Highway Engineer & Contractor*, 9-22, 2500 w. CS.

Testing Hollow Building Tile. Results of comparative study of methods of testing hollow tile, show that wide differences in results are due to differences in apparatus and technique. WM. B. NEWHALL, *Eng. News-Record*, 9-7-22, 1000 w. CS.

Using Removable Steel Forms. Describes method of using steel forms for concrete beam and joint floor construction using very light-gauge steel forms for moderate spans. Forms standardized, consist of standard steel channels of certain length to be used for soffits with equal amount of 14-gauge steel pans with detachable headers and corresponding amount of stretchers and cover plates. Gives details of use. Construction Economics Edition *Am. Contractor*, 8-5-22, 1500 w. CS.

Making the Plant Fireproof. Description of Canadian lime plant using gypsum to cover walls, floors and roofs of wooden buildings to make them fire resistive. J. F. CAMERON, *Rock Products*, 8-26-22, 1000 w. CS.

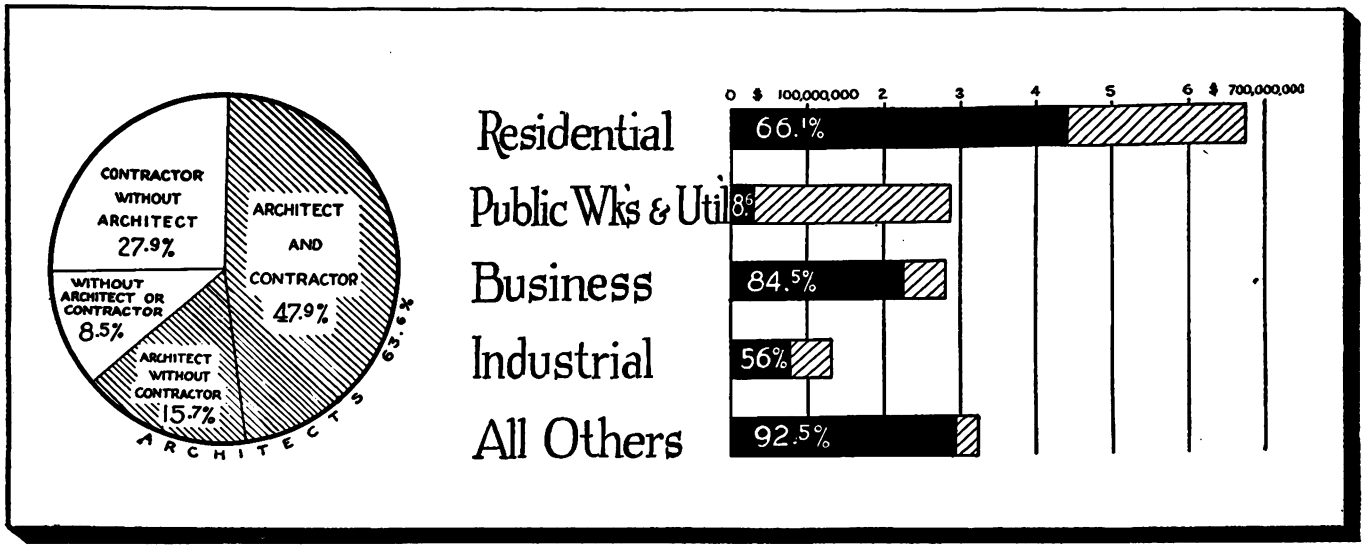
Telescoping Tower on Scow Shifts Arch Centers. Assembled steel centers for 66-ft. arches will be set up and taken down some 90 times by means of floating crector employed at Susquehanna bridge at Harrisburg. Erector consists of steel frame tower mounted on scow, made of three parts which slide up and down on each other, or "telescope," so as to alter height of tower. Full description given. *Eng. News-Record*, 8-24-22, 1000 w. CS.

Flashings for Stone-Faced Buildings. One of most important details of construction for buildings faced with light-colored stone is proper slashing of gutters, parapet walls and copings, in connection with cornices and wherever there is any danger of water finding its way into walls. Gives methods recommended by Quarrymen's Association. *Stone*, 8-22, 1500 w. CS.

How to Make Forms for Concrete Buildings. Sixth article of series, covering belt courses and cornices. WILLIAM F. LOCKHARDT, *Concrete*, 8-22, 1000 w. CS.

Enamel Finish on Interior Trim. Enamel finish bids well to surpass in popularity all other types of finish for interior wood trim in modern residence construction. While particularly adapted to so-called colonial type, its use need not be limited to that style. Covers various enamels and their application. A. H. BURT, *National Builder*, 8-22, 2000 w. CS.

Comparison of Plain and Reinforced Paving Bases. Report as to desirability and ultimate economy to be secured by use of 8-in. plain concrete, or reinforced concrete foundation for street paving. Conclusions are: Concrete pavements are most desirable from point of tractive effort, ratio as determined being about 47 for concrete to 74 for asphalt; a 6-in. pavement properly reinforced will be about 300% stronger than 6-in. plain concrete, and will cost about same as 8-in. plain concrete. J. A. MCCABE, *Concrete*, 8-22, 1500 w. CS.



Percentage of construction planned by architects the first six months 1922 (27 Northeastern States)

Total construction was $1,690,984,200; planned by architects, $1,075,466,000; analysis shown in circle. At right is analysis of construction by classes—black areas show percentage planned by architects.—(Figures tabulated from Dodge construction reports by *Architectural Record.*)

Pavement Maintenance Costs. Costs given for five standard types of pavements in Wichita, Kan. Suggests some changes in specifications as desirable. P. L. BROCKWAY, *Eng. News-Record*, 9-7-22, 2000 w. CS.

Flat Slab Reinforced Concrete Construction of Office Buildings. Comparison of this type with other construction methods, with special reference to savings in cost. WALTER H. WHEELER, *Bldgs. & Bldg. Management*, 9-4-22, 1500 w. CS.

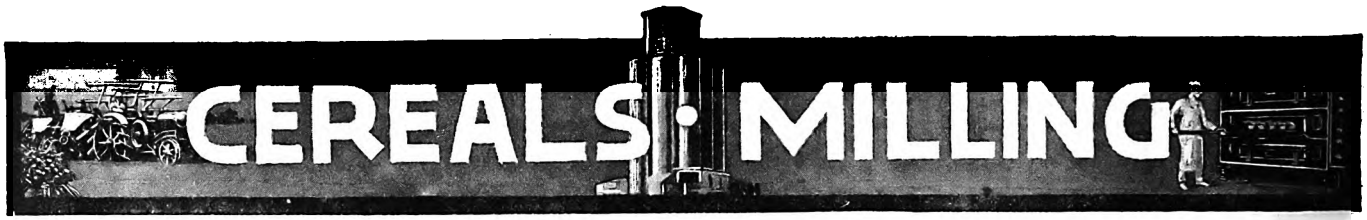
Practical Stone-Cutting and Drafting. Part I. Covers arches in circular walls. ED. W. HIND, *Stone*, 8-22, 1000 w. CS.

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Paying for Wheat by Grade

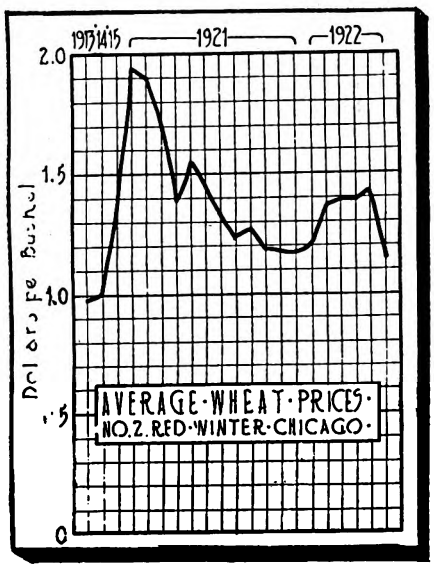
ACCORDING to *Modern Miller,* receipts at the winter wheat markets have been running materially below the volume of a year ago, not only because of the car shortage, but because of the determination of farmers to hold their wheat for better prices. It is believed that speculative trade is responsible to some extent for present low values, and it is doubtful if interest on the part of investors can be aroused until the price of wheat is considerably below a dollar a bushel. The price of No. 2 Red Winter has not been below $1 since 1914, as seen in the chart below.

Another factor that is likely to influence prices is the quality of the wheat. According to reports received by the Department of Agriculture, the quality of winter wheat this year is 4.1 points below the average for the last ten years, and in the opinion of *Finance and Industry* there is a definite trend toward a change in the standards on which prices paid farmers for wheat are based. This publication quotes a recent statement issued by A. E. Anderson, director of grain marketing for the Ohio Farm Bureau Federation, as saying that as a result of discoveries made in scientific milling it is believed that higher prices will be paid per bushel to the man who produces grain of superior milling quality. This movement has already made considerable headway in the Southwest. Some of the terminals there have laboratories for the determination of protein percentage and the quantity and quality of gluten content, and are making their payments on this standard. One recent report told of differences of 12 and 13 cents a bushel on 1% of protein within the same Federal grade.

Chemistry of Wheat Products. General discussion in non-technical language of cereal chemistry. Nearly all sound flours will make reasonably good bread if properly handled. Making of loaf of bread by itself does not determine all characteristics of flour, but by comparing at same time bread baked from flour with color of flour and gluten, ash and absorption, we were able to determine quite clearly grade of flour we have and learn something of kind of wheat from which it was made. By comparing these several characteristics of flour under examination with same characteristics of flour of known quality, it is possible to fix relative grade of flour examined. GEORGE L. TELLER, *National Miller,* 7-22, 3000 w. CJW.

Soft Wheat Milling, Tempering, Purification and Reduction. Selection of good milling wheat important. Necessary to grade extreme moisture of wheat one way or another. Long time to equalize moisture. Hours of temper depends on moisture wheat has. Moisture test should be made at time of tempering. Scouring to be done after tempering. Gives scour better chance to scour wheat and remove bees-wing and wheat beard. Broader and cleaner bran is, cleaner the mill products. Steam and water best means for tempering. Wheat must be tempered to obtain best results. More uniform middlings are in size going to individual rolls, better are results obtained in grinding. No fixed rules about adjusting purifier. Number of reductions depends on size of mill. Organization big factor. Author gives duties of head miller. JAMES J. SCHEURICH, *Modern Miller,* 7-22-22, 2000 w. JB.

Flour Bleaching. Three reagents used, nitrogen peroxide, chlorine and nitrogen trichloride. All applied to flour in gaseous form in one of several types of agitators. Bread from treated flour (nitrogen peroxide) is whiter but shows no difference in volume or texture. Chlorine produces very definite changes in acidity, per cent of soluble proteins and consistent decrease in gliadin. These flours require less fermentation than untreated flours. Nitrogen trichloride does not affect chemical composition of flour, and bread shows no increase in volume, but is much whiter, has better texture and beautiful bloom. HARRY E. WEAVER, *Modern Miller,* 6-10-22, 1000 w. CJW.



Wheat prices in Chicago, 1913-1922
(Magazine of Wall Street.)

Maturing Flour. Any treatment of flour, to condition it for its best baking results, which does not increase the intensity of its acidity, does not condition the flour in same manner as such flour is conditioned in storage. Proper control of intensity of acidity of flour, such as may be accomplished through treatment with chlorine, or any other means which accomplishes same result, affects favorably those factors which are so essential to satisfactory baking efficiency of flour. Optimum intensity of acidity for best results is such that methyl red should just turn red without any orange nuance when this indicator is applied to freshly cut surface of oven product. This intensity of acidity is that factor which, under proper control, favorably affects dough viscosity, by reducing it toward its minimum and, at same time, produces those changes which increase elasticity of gluten. It lessens period of fermentation by increasing activity of yeast. It also acts favorably in control of "rope." Flour which has been submitted to chlorine treatment is stabilized in sense that its improved baking capacity remains constant for many months. This is brought about by arresting action of those enzymes to which is due increase in acidity of an untreated flour when stored. Such flour is also much less readily subject to usual rancidity, mold and insect infestation. Method of treatment discussed in later article. FRED. L. DUNLAP, *Chem. Met. Eng.,* 7-26-22, 2500 w. CJW.

Grinding on the Breaks. Kind and condition of wheat when it reaches first break and atmospheric changes cause results of mill to vary. Grain of wheat composed of epidermis or cuticle, "epicarp," "endocarp," tests (episperm), membrane, alverone cells, endosperm, layer of parenchymatous cellulose and "hilum" of individual granule. To obtain many clean middlings, style of corrugation must be found suitable to class of wheat used. Popular cuts are Dawson A, Style "G," hollow back. Mills of medium and large capacity competing with world markets should have four to six breaks. Two and three break mills do good work with best grade wheat. Bulk of work should be done on first three breaks because bran contains more endosperm, and middlings from these breaks feed the head end of reducing system. Excessive pressure and heat of middling rolls produce flakes. S. HOWE, *Modern Miller,* 7-8-22, 3500 w. JB.

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CEMENT·STONE·BRICK

Brick Production Normal

IN spite of the cost and scarcity of coal and the unsatisfactory transportation conditions, brick manufacturers are reported to be keeping production almost up to normal. A little short of 112,000,000 brick were produced by 94 manufacturers in August as against 106,000,000 produced the month before by 95 manufacturers. *The American Contractor* points out that there has been only a slight increase in the average price of brick. Out of 94 firms reporting to this publication, 71 believe that the immediate outlook is good or fair; only four of the firms feeling discouraged enough to say poor or bad.

The great preponderance of orders on books over stocks on hand is regarded as very encouraging. A large proportion of these orders is believed to be the direct result of the advertising campaign which the brick manufacturers have been running for three building seasons. The surest indication that underlying economic conditions are fundamentally sound is shown by the great volume of building contracts now being let in spite of unsettled conditions.

Portland Cement. Deterioration is due to hydration of cement by absorption of moisture from humid atmosphere or by exposure to actual rainfall. Cement stored in cloth sacks retained 80% of its original strength after three months' storage, 71% after six months, 61% after one year and 40% after two years. Two feasible improvements would be storage and transportation of cement in bulk, or storage and transportation of cement in form of unground, clinker and grinding clinker at destination. In former case, deterioration is less because of smaller area exposed. Saving effected by eliminating use of bags. Improvement in quality of cement from stored clinker is due to hydration of any free lime. Mechanical disintegration of clinker during storage makes grinding easier. Saving would also be effected in shipping costs. Impractical to grind clinker for any project using less than 30,000 or 40,000 barrels of cement. W. M. MYERS, Bureau of Mines, Reports of Investigations, No. 2377, 7-22, 5 pp. CJW.

Cement Manufacture. Qualities most desirable in cement are soundness, strength and uniformity in rate of setting and hardening. All are dependent to marked degree on chemical composition, fineness of raw materials and burning. These three steps are therefore ones which must be under perfect control if quality cement is to be produced. Chemical composition should be considered as keystone of the arch. Unfortunately it is step least under control. While there are many plants where unsound or quick setting cement is a rarity, even here there might be an appreciable improvement in quality by closer regulation of chemical composition. Most cement chemists are playing safe, as it were, rather than attempting to attain any ideals. Perfect control of composition would enable them to make cements much higher in lime than they do at present with result that their clinker would be more easily ground and resulting cement stronger and more uniform in setting and hardening qualities. R. K. MEADE, *Chem. Met. Eng.*, 8-9-22, 3000 w. CJW.

Manufacture of Magnesium Oxychloride Cement. Covers salient points based on recent test of plastic calcined magnesite. Covers ingredients, chemistry, manufacture and suggested specifications. *Rock Products*, 7-29-22, 1500 w. CS.

Durability of Cement Drain Tile. Report of inspection in 1919 and 1920 of experimental drain tile and concrete block installations at 8 alkali-bearing projects in West. Investigation has been carried on since 1913, and conclusion to date is that best quality of concrete will disintegrate when exposed to severe alkali attack and that installations of concrete in soils containing more than 0.1% of salts of the sulfate type should be preceded by an examination of surrounding conditions. G. M. WILLIAMS, Bureau of Standards, Technologic Paper No. 214 (1922), 30 pp. 10 cents. CJW.

Design and Operation of Modern Concrete Gravity Plant. Success in modern concrete construction depends largely upon use and efficient operation of concrete gravity plant. Consists of hoisting bucket in steel or wood tower, receiving hopper near top of tower, sheaves for the hoist line and series of chutes by which concrete is carried from hopper to forms. Gives illustration typical installations. *Engineering World*, 8-22, 1000 w. CS.

Sand, a Little Understood Raw Material. This is really a plea for technical research into the properties of sand so that standards may be established which will do away with present rule-of-thumb methods. Author points out the extent and importance of some of the work done with sand, such as cleaning or sand blasting in cast iron, steel castings, other metals, other materials, molding and the sands used therein for green sand, dry sand and loam, also core sands. Many other uses are mentioned briefly, and some of the chemical and physical properties. F. G. SCHULTZ, *Raw Material*, 6-22, 2200 w. MAH.

My Experience with Rotary Kiln Lime Burning. Gives experiences of lime manufacturer, covering fuel, size of stone, kiln loading and speeds, hand operation, kiln inclination, dusting in rotary kiln, quadrant partition plates and dangers. IRVING WARNER, *Rock Products*, 7-29-22, 2000 w. CS.

Increasing Kiln Volume without More Kilns. Illustrated article of Minter System of continuous burning in periodic kilns. Kilns already on plant, with addition of specific flue system and fans, may be operated on continuous system and gain advantages which accrue to such principle of operation, such as reduction of fuel, speed of burning and increased kiln capacity. Records show fuel out on round down-draft kilns of $75 to $100 per burn. Gives complete description. *Brick & Clay Record*, 7-25-22, 2000 w. CS.

Continuous Kiln Will Be Kiln of Future. Gas fired continuous tunnel kilns are receiving considerable attention in England. Greatest success with tile, sanitary ware and glazed brick. They are bulk producers and require considerable space. Oil could be used if there was guarantee of no increase in price. *Brick & Clay Record*, 7-25-22, 1000 w. CS.

Developing Gravel for Road Use. Gives experiences of Maine State Highway Commission in surfacing gravel roads with tar, as hint to gravel producers to extend use of their product in other section of country. Gives methods of use, cost and maintenance. PAUL D. SARGENT, *Rock Products*, 7-29-22, 2200 w. CS.

Slate. Eighth article of series on origin, manufacture and use. Covers ancient and present-day uses. J. K. COSTELLO, *Building Materials*, 8-22, 1000 w. CS.

In the course of the investigation of Georgia clays and bauxites, being conducted by the Bureau of Mines at the ceramic experiment station, Columbus, O., bricks were recently made from twelve of these clays, previously calcined at 1450° C. Porosities, load tests under heat, spalling tests and slag penetration tests were run on the burned bricks, some of them proving to be of excellent quality. The more bauxite clays did not make sufficiently dense bricks to withstand the load and spalling tests.—*U. S. Bureau of Mines.*

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Industrial Chemicals in Demand

A STEADY improvement in the demand for chemicals is reported by close observers of the chemical market. Some of the largest and most conservative interests predict that the last quarter of the year will be the best and most prosperous period. *Chemical Color and Oil Record* points out that the improvement is best shown by comparison with the beginning of the year or with conditions last year at this time. *Textile World* states that in chemicals generally there is a firm, genuine demand, and *Fibre and Fabric* reports that there has been a very good trading in first hands in the industrial chemicals market. While it is true that a considerable portion of the gain in orders was due to the desire to make these purchases before the new tariff goes into effect, much of it is believed to be the result of improved business conditions in the country at the present time.

According to *Drug and Chemical Markets,* the price trend appears to be steadily upward. The cessation of production and consistent refusal of the drug and chemical industries of the United States to replace depleted stocks over a period of some two years are now beginning to make themselves felt. The long period of inactivity has permitted practically all stocks of manufactured chemicals to become short and it will probably be many months before the resumption of plant operations can replace depleted supplies.

Colloid Chemistry. Important that workers in every field of industry should recognize the role of colloid chemistry and be prepared to make the best possible use of it. Examples are cited. Flotation of ores, colloidal absorbents, colloid mills, water purification and sewage disposal, tanning, lubrication, colloidal fuel, metallurgy, petroluem, clay, insecticides, fire extinguishers (firefoam), rubber, baking and bread making, varnishes, oils and paints, milk and milk products have all called on colloid chemistry in their progress. J. ALEXANDER, *J. Ind. Eng. Chem.,* 9-22, 3000 w. CJW.

Intermediates. Review of chemistry of these compounds. Progress has been diversified. In few instances results have led to production and utilization of new compounds while in majority of cases achievements have not been epoch making but rather necessary improvements to make already existing processes adaptable to modern economic conditions or development of new processes for old products. Discussion by groups of compounds, such as aldehydes, amines, acids, etc. M. L. CROSSLEY, *J. Ind. Eng. Chem.,* 9-22, 4000 w. CJW.

Nitrogen Fixation. General lines of development, progress and present status of nitrogen fixation indicated. Only three processes in successful commercial operation, arc, cyanamide and direct synthetic ammonia (Haber). None of other processes thus far suggested appear to give promise of commercial development in very near future. Brief discussion of the three processes. Problem of lowering cost of process is very large and many years will be needed to accomplish it. J. M. BRAHAM, *J. Ind. Eng. Chem.,* 9-22, 2500 w. CJW.

Commercial Limes. Large variation in available lime content (that portion of total oxide content of lime which is easily soluble in water and thus available as source of hydroxyl ions) of commercial quicklimes and hydrated limes. Calcium limes have much higher available lime content than magnesium limes, but reduction in available lime content by hydration of magnesium limes is less than that of calcium limes. Differences between quicklimes and corresponding hydrates are consistent enough to warrant conclusion that certain conditions obtain in modern mechanical processes of hydration which tend to reduce available lime content. Causes to be discussed in detail in later article. M. L. HOLMES and G. J. FINK, *Chem. Met. Eng.,* 8-23-22, 2000 w. CJW.

Industrial Alcohol. Attempt to explain in as simple terms as possible operation of present industrial tax-free alcohol laws as they affect the industrial chemist. Six authorized formulas for completely denatured alcohol, using wood alcohol, benzene, pyridine, kerosene, ether, etc. Recovery of potable alcohol from mixture extremely difficult. Chief uses of such mixtures are fuels, anti-freezing solutions, cleaners, shellacs, varnishes, paints and technical purification processes. Seventy authorized formulas for specially denatured alcohol. Method of obtaining some of these special formulas. Principal formulas and their uses. Treasury department is interested in obtaining all information and suggestions possible that will enable it to administer provisions of national prohibition act with greatest possible benefit to industry. JAMES M. DORAN, *Chem. Met. Eng.,* 8-23-22, 1500 w. CJW.

Potash. Only one commercial plant making potash as main product today. Possibilities are found in New Jersey greensand, Nebraska lakes, Utah alunite, Wyoming leucite, natural brine deposits of California and Texas deposits, as well as by-product recovery. Labor conditions against American industry. Struggle for existence has included bitter fight against propaganda, such as presence of borax in product which was injurious to crops. We will have a large industry if we support it now and a small one whether it is supported or not. J. E. TEEPLE, *J. Ind. Eng. Chem.,* 9-22, 2500 w. CJW.

Tobacco Industry. All processes in manufacture of tobacco based on chemical changes and reactions, few of which are understood. Among accomplishments are solving of fertilizer problem, explanation of why "topping" produces larger and better bodied leaf, questions of curing, protection of brands, cigarette paper, adhesives, control of moisture content of tobacco, etc. Still many problems to be solved. A. L. CHESLEY, *J. Ind. Eng. Chem.* 9-22, 3500 w. CJW.

Hardwood Distillation. During last ten years great progress has been made in methods employed. Ovens have practically replaced smaller retort types, and tendency of modern plant is toward larger units. Used in conjunction with charcoal pig-iron blast furnaces. Brief description of process of distillation. Stafford process, for chips, sawdust, etc., employs heat of exothermic reaction of cellulose when at carbonizing temperature. When predried and preheated, exothermic heat is sufficient under properly maintained conditions to bring additional material to carbonizing point. Gives same yields of methyl alcohol and charcoal and 50% increase in acetic acid. Use of multiple effect evaporators has proved great economy factor in working up pyroligneous acid. Triple effects may be used in evaporation of acetate of lime. Other practices discussed. H. C. MERRIAM, *J. Ind. Eng. Chem.,* 9-22, 2500 w. CJW.

Writing Inks. Iron inks are important because no insoluble compound is formed with iron in ferrous condition, so that ink may be made from ferrous salt and applied without being materially oxidized and color is then developed on fiber of paper by oxidation. Certain quantity of suitable blue dye added to give blue color to ink, since iron tannate alone must be partially oxidized before color becomes visible. Present inks contain larger portion of aniline dye, which give them better keeping power and render them less corrosive. Four requirements for ink are: color, permanency, stability and non-corrosiveness. Other classes of inks are chrome-logwood inks, so-called "jet-black" inks, which are not very stable; aniline-dye inks, which include practically all colored inks; carbon inks, consisting of carbon suspended in a fairly stable condition, and Prussian blue inks. Tests in which quality of ink is determined directly are more useful than merely analytical tests. Principal problem confronting modern ink manufacturer is to produce ink in which four qualities named above shall be blended in best possible way, profitably at low price. Ideal ink would be one in which carbon or an equally stable substance would be a solution in a cheap, non-corrosive and stable medium. Choice of dye still remains difficult. FRANK F. RUPERT, *Chemical Age,* 8-22, 2000 w. CJW.

Classification of the More Important Industrial Catalytic Reactions

Type of Catalyst	Samples of Exemplification in Industrial Practice
	Hydration and Hydrolysis
Acids	(a) Hydrolysis of glycerides, soap and candle industry, sulphuric, sulphonic (Twitchell reagent) acids as catalysts.
	(b) Hydrolysis of starches and wood cellulose to yield sugars. Sulphuric, hydrochloric, sulphurous acids as catalysts.
	(c) Hydrolysis of esters using acids.
	(d) Hydration of acetylene to yield acetaldehyde. Various acids as catalysts.
Alkalies	(a) Hydrolysis as in (a) and (c) above. NaOH, KOH, $Ca(OH)_2$, MgO, ZnO as catalysts.
	Dehydration
Acids	(a) Manufacture of ether. Sulphuric, sulphonic and phosphoric acids as catalysts.
	(b) Esterification processes. Hydrochloric and sulphuric acids as catalysts.
Oxides	(a) Manufacture of ethylene and unsaturated hydrocarbons. Clays, Al_2O_3, SiO_2, TiO_2 as catalysts.
	Halogenation
Non-metallic elements	(a) Chlorination of carbon disulphide, carbon-monoxide and hydrocarbons. Carbons, iodine, sulphur as contact agents.
Chlorides	(a) In synthetic organic, chemistry. $AlCl_3$, $FeCl_3$, $SbCl_5$, $SnCl_4$, $ZnCl_2$, $HgCl_2$, as contact agents.
	Oxidation
Metals, especially the platinum metals	(a) Contact sulphuric acid process using finely divided platinum on a suitable support.
	(b) The oxidation of ammonia using a platinum gauze.
	(c) The preparation of formaldehyde, using copper or silver (see dehydrogenation).
Oxides	(a) Lead chamber process, employing a gaseous catalyst, oxides of nitrogen.
	(b) Contact sulphuric acid manufacture with iron oxide catalyst.
	(c) Chance-Claus process of sulphur recovery. Oxide of iron as catalyst.
	(d) Purification of illuminating gas. Hydrated oxide of iron as catalyst.
	(e) Surface combustion processes, refractory oxides as catalysts.
	(f) Oxidation of hydrocarbons, V_2O_5, MoO_3, WO_3, etc., as catalysts.
Salts	(a) *Deacon chlorine process, copper chloride as catalyst.
	(b) Oxidation processes in the dye industry. Mercury and copper salts.
	(c) Oxidation of aldehydes, manganese salts as catalysts.
	(d) Drying of oils. Metallic soaps as accelerators.
	Hydrogenation
Metals	(a) Hydrogenation of oils. Nickel and platinum as contact agents.
	(b) Fine organic chemical industry, *e. g.*, synthesis of cyclo-hexane, reduction of organic compounds. Nickel as catalyst.
Oxides	(a) Hydrogenation of oils, nickel oxide as catalyst (especially at elevated pressures).
	Dehydrogenation
Metals	(a) Cracking of oils, nickel, copper, iron, aluminum as catalysts.
	(b) Dehydrogenation of alcohols, copper, silver and nickel as catalysts.
Oxides	(a) Cracking of oils, Al_2O_3, and TiO_2 as catalysts.
	(b) Dehydrogenation of alcohols, ZnO, SnO, CaO and MgO as catalysts.
	Nitrogen Fixation
Metals and metal-oxide mixtures	(a) Ammonia synthesis. Reduced iron, iron-molybdenum, iron-potash, and nickel-sodium as contact agents.
	(b) Cyanide formation. Reduced iron as catalyst.
	(c) Arc process of oxide of nitrogen formation. Metal electrodes as negative catalysts.
	(d) Nitride formation (Serpek process). Iron, copper, chromium, molybdenum, etc., as catalysts.

See "Catalysis" digest below.

(Chemical Age)

Catalysis. Very careful analysis of catalytic reactions, especially from industrial viewpoint. See accompanying table. Each class of reactions has its own class of catalytic agent. Catalyst accelerates both forward and backward reactions of equilibrium process.. Determination of most favorable conditions important, though approximations are useful in absence of exact data. Various forms of catalysts discussed. Suitable foreign substances may act as "promoters," while others act as poisons for the catalytic agent. Hugh S. Taylor, *Chemical Age,* 7-22, 4500 w. CJW.

Fertilizers. Chemical control has forced dishonest dealer out of fertilizer field, has increased efficiency of factory and field practice and has educated farmer to value of various brands. Discussion of source and reserve of potash salts, nitrogen carriers and phosphoric acid and phosphates. Trend of fertilizer industry today is toward manufacture and use of more concentrated products. Direct manufacture of phosphoric acid and synthetic production of ammonia requires wider use of definite and relatively pure chemicals for fertilzer purposes, for these two compounds must be combined with base and acid respectively, in order to ship, handle and distribute them successfully. Now true chemical industry founded upon scientific principles. W. H. Waggaman, *J. Ind. Eng. Chem.* 9-22, 2500 w. CJW.

Bone as a Fertilizer. Bonemeal, because of the excellency of its effect on crop yields, has acquired a well-merited popularity. Its mechanical condition is always good. It contains a high percentage of phosphoric acid. It can be used to best advantage by man who owns his farm and expects to cultivate it himself for a sufficiently long time to derive full measure of benefit from this more slowly available phosphate. In final analysis, however, the relative cost of a unit of phosphoric acid in bonemeal and in acid phosphate should be usually the deciding factor in their purchase. The small amount of nitrogen in bonemeal should be left out of consideration. E. E. Barnes, *Commercial Fertilizer,* 8-22, 1200 w. CJW.

Specifications for Green Paint. Paint contemplated by this specification is chrome green paint. Pigment should be chrome green containing about 23% of color, about 10% of magnesium silicate, aluminum silicate or similar siliceous material, and about 67% of barium sulphate. It should be made by precipitating the color on the proper base rather than by mixing the individual materials. Officially adopted by Federal Specifications Board, Feb. 3, 1922, Bureau of Standards, Circular 97, 3rd Ed., 7-3-22, 10 pp. CJW.

Specifications for Iron-Oxide Paints. Specifications applying to iron-oxide and iron-hydroxide paints of red and brown color, in form of semipaste paint or ready-mixed paint officially adopted by Federal Specifications Board, Feb. 3, 1922. Directions are given for sampling and laboratory examination, with methods of preparation of reagents used. Bureau of Standards, Circular 93 (2nd Ed.), 9 pp. 6-21-22. CJW.

Vegetable Glue. This is a homogeneous mixture of starch, water and solvent for amylocellulose, such as caustic soda. Cassava starch is basis. Water content varies from 2 to 4 times weight of starch and caustic is generally about 2% to 12% (usually 5%) of weight of starch. Widest use in veneering industry. Do not have waterproof qualities of casein. Chief disadvantage is tendency of some of these glues to stain certain woods. In practice, if raw starch is cooked with caustic a workable glue will result. Annual market in this field is 20 or 30 million lbs. of starch. C. K. Reiman, *J. Ind. Eng. Chem.,* 9-22, 1500 w. CJW.

Modern Chemical Plant. Successful conduct of industry today depends upon good plant engineering. Location of plant should include reference to raw materials, markets for finished products, labor supply, transportation for raw materials and finished product. Layout includes delivery of raw materials to plant, storage of raw materials, introduction of these into manufacturing process, "straight line" process of manufacturing, storage of goods in process and of finished product, expansion, handling materials, machine layouts, special equipment. Physical plant which comprises buildings can be determined after layout is made. Proper construction means execution economically and in minimum amount of time, of plans and specifications of designing engineer. Modern labor-saving equipment frequently means difference between profit and loss. Frank D. Chase, *Chem. Met. Eng.,* 8-30-22. 2500 w. CJW.

Helium. Popular story of discovery of helium and development of Government plants for preparation and purification of this valuable gas. R. B. Moore, Bureau of Mines, *Reports of Investigations,* No. 2363, 1000 w. CJW.

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CLOTHING·GARMENTS

Gradual Recovery in Clothing Trade

ACCORDING to representative papers in the clothing field, conditions in the trade are gradually improving. *Clothing Trade Journal* reports that while in many cases small-sized orders are still being placed, it is no doubt due to more exacting credit requirements. *New York Commercial* points out that the market for woolen and worsted goods, in both women's wear and men's wear fabrics, has been much more active recently. *American Cloak and Suit Review* states that August sales promise well for the coming season. Nevertheless there are a number of factors that retard recovery. One of the most disturbing is the wide variety of styles offered in both men's and women's wear. The buying, covering a wide range of styles, offers less profit to manufacturers.

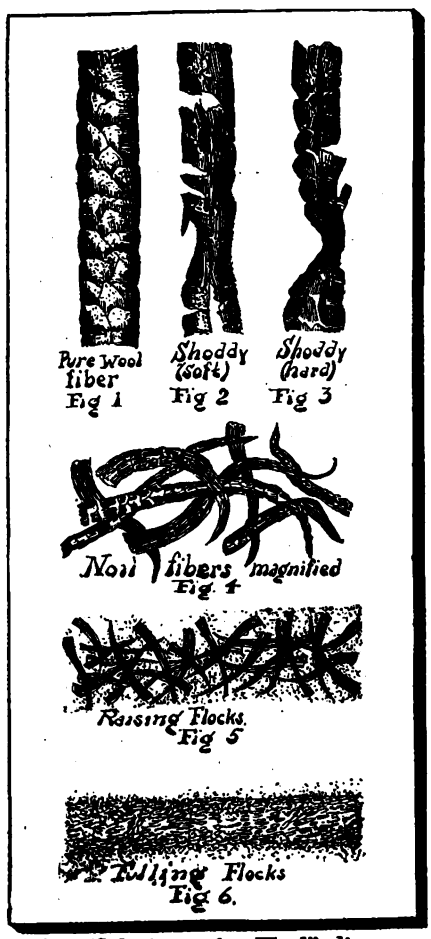
In commenting on conditions, *Women's Wear* cites several handicaps that exist at present. There is a tendency on the part of retailers not to carry large assortments, which not only restricts the placing of large orders but reacts unfavorably on the manufacturers in ordering their own supplies. It is pointed out that the competition created by the stock houses is being felt more keenly than ever before and that manufacturers have to ask for from ten days to four weeks to secure deliveries on their orders. While in the early part of the season they are able to wait a month for deliveries, it is now impossible to place orders far in advance.

At the recent convention of the National Association of Retail Clothiers, the general feeling was that purchases for spring and summer men's wear ought to be made in much larger volume. However, to offset this there is the difficulty, according to retailers, of selecting from a very large number of advertised lines, and this, distributors agree, is reacting to the disadvantage of the manufacturer who is dissipating his profit over too many small lots.

Substitutes for Wool. Substitute fibers known as shoddy, mungo, noil, flocks, and extract wool. Less than 20% of stock in woolen or worsted fabric is shoddy. Value of shoddy depends on whether it is made from soft or hard rags. Difference in magnified appearance of hard and soft class of shoddy fiber is shown. Mungo manufactured from any kind of old rags not suitable for service in either of shoddy grades. Noils are short, curly, broken fibers cast out of combing machines in the process of making worsted yarns. They are pure wool, but do not possess characteristics of fibers from which they were extracted. Botany, English, Mohair and Alpaca are four classes of noil. GEORGE RICE, *National Retail Clothier*, 8-17-22, 1500 w. JB.

Bolivia Cloth. Characteristics of bolivia cloth in finished condition are lofty, soft, plushy feel and lustrous silky appearance. By means of stock blends an attractive pattern effect may be developed in piece dyeing or as result of certain operations in finishing neat and novel form of pattern may be created. Construction of high-grade cloth, cotton warp quality, medium weight cloth and artificial silk mixture given. Pieces of cloth as received from weaving room are burled, then fulled to proper width and shrunk in length to hold 10 per cent. They are then washed, extracted and dyed. Following this the pieces are napped on the face from reverse ends until every face filling thread is cut through in tiny lengths. They are then sheared down until the desired point is reached, and needed repairing or trimming executed. In fulling, fabric is shrunk in length to hold 12.5% after being finished. *Textile World*, 9-9-22, 1500 w. CJW.

Fifteen per cent of all cloth manufactured in Germany is made of sweepings, rags, clippings and cotton waste.—*Dearborn Independent.*



See "Substitutes for Wool" digest.

How Leghorns Are Made. Made from straw plaited into braid. Florence, Italy, only city which produces fine, thin straw used in the making of leghorns. Attempts to grow it in other parts of world unsuccessful. Method of growing described. Process of sorting out different sizes of straw formerly done by hand. For past ten years machine has done this kind of work. Punta and pedal straws sorted separately. All punta straw used in making leghorns, but only some pedal straw is used for this purpose. Plaiting of straw into braid done by hand. Leghorn braids composed of 9, 11, or 13 strands, braids being from 1-8 inch to 9-32 inch wide, and 82 to 131 feet in length. Length of continuous strip of braid governed by size of hat intended. No stitching in leghorn hat. Takes about four days to make a leghorn. When hats are completed, they are stiffened with gelatine and laid out in open to dry. Hats usually shaped in countries to which they are exported. *American Hatter*, 9-22, 1000 w. JB.

Heat Retaining Value of Cloths. Study has been made of comparative value of serge and serge and paper in retaining heat. The results are rather indefinite and hard to translate. Serge prevented the escape of 26 heat units, while serge and paper prevented 31 units. One fact is obvious: Two thicknesses of cloth do not retain twice the heat retained by one thickness, and three thicknesses retain relatively less. H. PRIESTMAN, *Textile World*, 9-9-22, 2500 w. CJW.

Hatting in Manhattan. Historical sketch. Curing of furs originally done by hand with sharp knife. Separation of coarse from fine fur affected in "blowing room" by means of blowing machine operating on same principle as used at present date. Methods of making hats described. In 1825 industry made rapid strides forward. Silk hat introduced by France in 1834. Superseded the "napped hat." *American Hatter*, 9-22, 2500 w. JB.

Preventing Static Electricity. One of greatest dangers in dry cleaning plants is generation of electricity. To guard against this, machinery may be grounded. Danger of fire greatest in dry or frosty weather; this may be prevented in part by using humidifying plant, which keeps moisture at or above 70% saturation, considered the minimum for safety. *National Cleaner & Dyer*, 8-22, 1000 w. CJW.

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ELECTRICITY

Use of Electricity in Industry Increasing

ONE of the most striking evidences of the advance of the electrical industry, according to *Power*, is furnished in the constantly increasing use of electricity for furnishing industrial power. In the early days lighting constituted practically the entire load and the equipment remained idle during the day. In 1887 there was generated 175,000,000 kilowatt-hours, of which less than 9% was applied to power, whereas in 1921 the total output exceeded 40,000,000,000 kilowatt-hours, of which industrial power accounted for over 60%. Three-fourths of this growth has occurred during the last ten years. That the curve is still pointing upward is believed to portend an ever-increasing influence of electricity on the industrial growth of the country.

In the lighting field the improvement has been no less marked. The results of numerous investigations conducted during the past few years have definitely shown that better lighting has advantages all out of proportion to its cost, and that these advantages apply not only in industry but in the illumination of commercial establishments, of homes and of streets.

Electricity in Chemical Industry. Includes use in motor drives, illumination, heating, transportation, electrolysis, electrical precipitation, and miscellaneous uses. Brief discussion of each. More important advantages of electric motor drives are: Direct application of power where desired, minimizing of shafting and belting, constant speed, and reliability. Advantage of electric heating is automatic control of temperature. Transportation by electric locomotives cheaper than by gasoline and much cheaper than by horse power. W. B. TODD, *Chem. Met. Eng.*, 9-13-22, 2400 w. CJW.

Dry Cells. Effect of temperature on open circuit voltage of dry cells is small and for most purposes can be neglected entirely. The short circuit current increases approximately 1 amp. for each 3° C between 0 and 25° C. At higher temperatures the rate of increase is somewhat less. In storage heat tends to produce leakage and increases rate of chemical reaction taking place within the cell. For heavy service a moderately high temperature is desirable but for light service a low temperature is better. Capacity depends on condition of cells, why they are made and arbitrary choice of cut-off voltage. Tables are given showing life in hours to various cut-off voltages for cells discharged through various resistances, and comparison is made of discharge through constant resistances with those at constant current. To be continued. G. W. VINAL and L. M. RITCHIE, *Chem. Met. Eng.*, 9-13-22, 3500 w. CJW.

Electric Motors for Driving Pumps. A comprehensive article giving characteristics of reciprocating, rotary and centrifugal types of pumps and the use of direct and alternating current motors to drive them. Methods of speed control of the motor. The important use to which pumps are put today in handling water in coal mines, providing adequate water supply in cities for domestic purposes and fire protection, etc., makes it very essential that the proper kind of motor be selected for driving the pump. R. A. JONES, *Power*, 9-5-22. IG.

Carbon Electrodes. Critical study of baking process as carried out in electric and gas-fired furnaces. Review of principles underlying their construction and design. Gas baking is gradually but surely displacing electric baking because of its cheaper cost. Greater ease and closeness of control of gas-fired furnace is decided advantage. Also permits of recovery of the more or less valuable products of electrode baking. Both types use about same amount of absolute energy in baking and large part of difference in cost is due to fact that heat unit from gasified coal is much cheaper than one from electric power. Average life of electric furnace is 3-4 times that of gas furnace. Finished electrodes from electric furnaces are more difficult to clean than from gas-fired ovens, but have advantage of having somewhat lower resistivity. Packing dust after being used in electric furnace is more difficult to grind and prepare for re-use than is case with dust from gas-fired furnaces. Electric furnaces are generally very dirty, while gas-fired furnaces have baking products drawn off in stack along with waste gases and are comparatively clean. C. L. MANTELL, *Chem. Met. Eng.*, 8-16-22, 4000 w. CJW.

Electric Blooming Mill Drive. An article dealing with a particular drive with its special features and with such operations and advantages mentioned as might apply to all blooming mills. S. N. ROBERTS, *Electric J.*, 9-22. IG.

Control Apparatus for Rolling Mill Motors. Correct design of control apparatus for AC rolling mill motors cannot be undertaken without knowledge of the power plant conditions and type of transmission line which will be used to supply power to the equipment. There are 12 factors in all which have an influence on the part of the control apparatus. These are power plant kv-a, voltage, frequency, power plant equivalent impedance characteristics, feeder circuit breaker-existence or non-existence, synchronous machinery on system, transmission line characteristics, method operating primary control, meter combinations, motor secondary electrical characteristics, accelerating torques and bare motor or flywheel combination drive. Detailed discussion of the control apparatus from the standpoint of these 12 conditions or factors is given in the article. W. R. WICKERHAM, *Electric J.*, 9-22. IG.

Spun glass cloth is being made for insulation of storage batteries.—*Steam Shovel & Dredge Mag.*

Opening Disconnector Switches. A disconnector switch is such a minor part of the electrical equipment in the high voltage AC power plant that its vital significance in safe plant operation is frequently not appreciated. Numerous examples of disasters which have happened on opening switches on a circuit carrying load may be cited. Too much care cannot be exercised in opening these switches. The author outlines practices that have proved to give a high degree of safety under a wide range of conditions. Of course the human element must be contended with in all operations of this kind, and about the best that can be done in this regard is to try to instruct the operators so thoroughly in the safe procedures that they will instinctively follow them, not only under ordinary operation, but also in emergencies. R. BROWN, *Power*, 7-12-22. IG.

New Induction Furnace. In this new induction furnace for melting non-ferrous metals, secondary consists of molten charge which is distinct from melting pot. There is, however, automatic uni-directional circulation produced between them by force of electromagnetic repulsion. It is shown that the maximum and minimum fluid pressure in the secondary exist at the ends of the cylinder, which pressure difference is utilized in causing the molten metal, of high or low conductivity, to circulate. J. M. WEED, *Trans. Am. Electrochem Soc.*, 8-25-22, 2500 w. CJW.

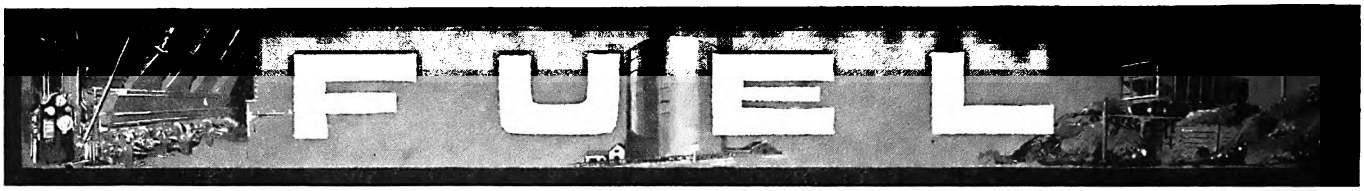
New Telephone Regulation Theories. Discussion of the report of the Michigan Commission. Exchange rates are classified according to groups. *Telephony*, 8-12-22, 2000 w. IG.

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Output of Bituminous Coal Increasing

REPORTS from all sources indicate that a gradual improvement is taking place in the mining and shipment of coal, particularly bituminous. *Coal Trade Bulletin* reports that the increased output of bituminous coal and the diversion of cars from the anthracite districts has brought about a softening of prices in the New York market. The fact that buyers are hesitating in placing large orders in the hope of still lower prices has also contributed to this condition of affairs.

According to *Coal Trade Bulletin*, the rate of production the middle of September was 9,600,000 tons a week. In the corresponding period of 1920 the average was 11,750,000 tons; in 1919, 11,340,000 tons, and in 1918 about 12,800,000 tons. The present rate of soft coal movement, even with priority in the use of open cars, is therefore 25% below 1918, 15% below 1919, and 18% below 1920.

It is believed, however, that the output of bituminous coal will aid considerably in relieving the fuel shortage. A number of industrial plants are planning to use bituminous and some domestic consumers are also considering its use. Fuel oil also promises to be extensively used. Many consumers of steam coal have turned to fuel oil and householders are beginning to consider the possibilities of small installations as permanent equipment.

Pulverized Coal in the Steel Plant. Application of pulverized fuel to open hearths, soaking pits, heating furnaces, sheet and pair furnaces and the results obtained. The chief advantage is the reduction of coal consumption. W. H. SEARIGHT, *Blast Furnace & Steel Plant*, 8-22, 2000 w. APS.

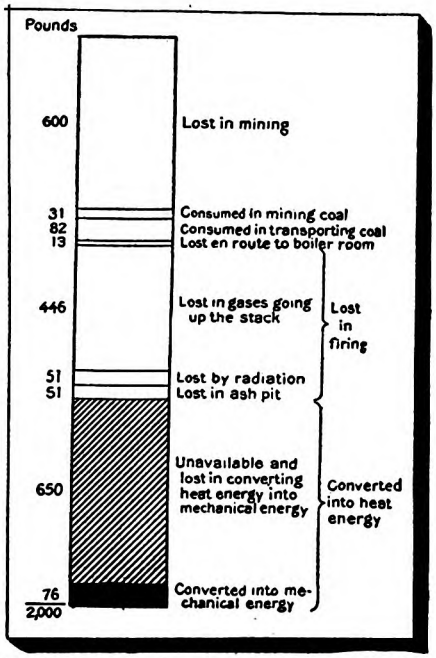
Coal at Sudbury. It is confidently asserted that anthracite exists near Sudbury, Canada, and suggestions are being made to the Department of Mines of Canada that the deposits should be investigated with a view to opening up possible supply of coal. T. W. GIBSON, *Canadian Mining J.*, 8-18-22, 1500 w. CJW.

Complete Gasification Layout. Description of layout for combined coal gas and water gas plant designed to secure greatest degree of conservation of heat and fuel. Original idea includes cooling of producer gas and recuperative stove. Most economical arrangement for plant layout and indication how plant of this kind solves in large measure accumulating difficulties in way of gas companies securing sufficient coal as well as balancing in most effective way ever-varying conditions in buying of crude materials and marketing residuals. LEWIS VINCENT, *Gas Age Record*, 8-19-22, 1200 w. IG.

Paris Has Modern Gas Equipment. An interesting and informative description of the gas equipment in Parisian gas plants; the methods of operation are given in detail. An electric charging machine is used. The consumer pays $3 a thousand cubic feet. There are three huge gas holders in the plant, each with a capacity of 150,000 cu. meters. Wherever possible, men are replaced by machinery. Plant is well equipped and up to date in every respect. H. B. HARTE, *American Gas J.*, 8-26-22. IG.

Industrial Uses of Fuel Oil. It is pointed out that burning oil efficiently is just as difficult as burning any other fuel efficiently. A list of uses of oil fuel is given. The cost of oil fuel compared with coal, gas and electricity is indicated. R. P. MAYNARD, *Oil News*, 8-20-22, 2500 w. IG.

Economically Burning Liquid Fuel. Factors affecting the use of air in oil burning, with comparison of cost. Volume air (4-12 ounce pressure), positive air (12 ounce—2-pound pressure), and high-pressure air (up to 100 pounds) systems are discussed, indicating under what conditions of type of burner, oil, etc., each type functions best, and concludes that the positive air system is best, or under certain conditions high-pressure air up to 15 pounds. W. C. BUELL, JR., *Blast Furnace & Steel Plant*, 8-22, 3300 w. APS.



It is known that much is lost in the process of bringing coal into use. The distribution of the losses is indicated in the above chart.—*(Century Co.)*

Measuring Fuel and Oil. Importance of more accurate inventories of raw materials in view of large factor such materials are in operation of gas works is emphasized. Tendency to constant shortage between fuel shipped and fuel checked off as used is ever present, and factor should be established, subject to change as conditions warrant. Success of inventory lies not in scientific accuracy of its measurement as it does in its frequency. Methods are given. TOM P. WALKER, *Gas Age Record*, 8-5-22, 3000 w. CJW.

Peat. Peat is excavated by Anrep type of digger, macerated by ordinary swing-hammer shredder, spread fairly thin on ground by conveyor belt and spreader and dried in sun. Dried product has been sold for $5.00 per ton, though no costs are available at present. Satisfactory net profit expected. *Canadian Mining J.*, 8-4-22, 1500 w. CJW.

Experience with Burning Sawdust. Description of some of the technical difficulties encountered in burning fine wood fuels. Furnaces, which appear fine in theory, give considerable trouble in practice. The description is in detail. O. L. SHERMAN, *Southern Engineer*, 8-22, 2500 w. IG.

Acetylene Burner Tests. Description of Rock-Light burner, designed to secure complete combustion of either purified or crude acetylene, which will not carbonize under any operating pressure. Gives about six times as much light from its mantle than from open burner. After being in use for 1600 hours, no decrease in candlepower was observed. C. F. ROCKSTROH, *Gas Age Record*, 8-5-22, 500 w. CJW.

Venturi Tubes and Orifices for Bulk Gas Measurement. Various types of measurement devices are described with special reference to British practice. The principle of their action is thoroughly explained. MAJOR JOHNSTONE-TAYLOR, *American Gas J.*, 8-19-22, 5000 w. IG.

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IRON·STEEL

Foundry Iron Scarce—Prices High

A CONTINUED tendency toward higher prices, a somewhat lighter demand for certain steel products due to the sold-up condition of the mills, and a generally more optimistic feeling over the fuel and transportation difficulties, are the outstanding features in the iron and steel industry, according to *Iron Trade Review.* Relief from the effect of the rail and fuel strikes is beginning to be felt. Coal is said to be moving from the mines at a rate somewhat in excess of current needs, and furnaces and mills are reporting a slight improvement in fuel shipments, though early improvement in conditions is rather hopefully expected.

The tendency toward higher prices is particularly marked in the case of pig-iron quotations. The supply of iron is so limited that in many cases inquiries are being turned down. The scarcity of foundry iron continues to cause consumers to depart from the usual trade channels in search of tonnage. Competitive premiums are also being offered by buyers—a fact which has aided considerably in keeping prices up. The fact that foreign ore has been brought into Atlantic ports and distributed throughout the East is believed by many authorities to be one of the chief reasons why prices have not advanced to unheard-of levels.

Centrifugal Iron Castings. British plant produces piston ring sleeves, engine cylinder liners, chilled wheels and rolls and cylindrical castings of all descriptions up to a maximum length of 36 inches and of varying diameters from 10 to 30 inches. Description of the casting machine. Analyses of the castings. Nickel-chrome castings. Improved melting plant consists of foundry cupola with special arrangement of auxiliaries. F. E. HURST, *Iron Age,* 8-31-22, 4000 w. APS.

Basic Electric Furnace Operation. Phosphorus is removed in slag under oxidizing conditions, a lime blanket being used to promote this condition. Sulfur is then removed under reducing conditions, obtained by using a deoxidizing slag of lime and ground petroleum coke. Calcium carbide is formed and sulfur is thoroughly removed. The oxidizing slug should be completely removed before the deoxidizing slag is formed. The basic electric furnace is ideal for making pig iron, malleable or gray iron castings, as high sulfur cannot exist in the presence of high carbon on a basic bottom. CHARLES WELLMAN FRANCIS, *Iron Age,* 8-17-22, 1500 w. APS.

Acid Electric Furnace Practice. A good basic scrap should be used. Operating details of charging furnace, etc. No slag mixture is added, as the impurities in the scrap and washings from the banks and side walls form sufficient slag. Methods of repairing, making and burning in a new bottom. Tapping and pouring problems. Alloy additions, when and how to make them. CHARLES WELLMAN FRANCIS, *Iron Age,* 8-10-22, 1800 w. APS.

Iron and Steel in the Cement Industry. Specifications for steels to meet problems in cement industry. Nickel steel for electric shovel shafts to meet increased stresses due to overload capacity of driving motor. The importance of proper heat treatment for steels. Failure of machinery is frequently due not to improper design or steel of incorrect analysis, but to improper heat treatment. The value of case hardening to produce resistance to wear while retaining resistance to shock. General article which does not go very much into detail. W. R. SHIMER, *Cement, Mill & Quarry,* 7-20-22, 4000 w. APS.

Cost of Electric Steel Melting. Gives table of comparison in detail of acid and basic electric furnace operation, 3½ tons per heat, and finds basic higher than the acid. Power, electrodes and labor are the chief controlling items, and basic practice is higher in each of these three respects. CHARLES WELLMAN FRANCIS, *Iron Age,* 8-31-22, 1500 w. APS.

Effect of Sulfur on Rivet Steel. Discussion of Committee's Report on Effect of Sulfur on Rivet Steel, American Society for Testing Materials. Accumulated evidence is that sulfur up to 10% (which is very much higher than is generally considered admissible) may be comparatively harmless. The committee reports results in form of tables and graphs, but has drawn no conclusions from their investigation. Their conclusions and a new set of specifications will be of great interest and benefit to the industry. J. S. UNGER, *Blast Furnace & Steel Plant,* 8-22, 1200 w. APS.

Utilizing Heat of Cupola to Warm Blast. Above the melting zone is a cast-iron jacket. The temperature in this region is not high enough to melt the jacket, but keeps it at a red heat. The jacket is encased in a steel shell and the air is preheated in this annular space. *Canadian Foundryman,* 8-22, 1800 w. APS.

Steam for Cooling Sheet Rolls. With the large-sized rolls (28 and 30 ins. diameter) used today, artificial cooling is necessary. Steam is used, but it roughens the rolls. Methods of applying the steam under varying conditions suggest the use of warm air for cooling to avoid the roughening caused by steam. GEORGE C. BROWN, *Iron Age,* 8-3-22, 1800 w. APS.

Continuous Heating Furnaces for Steel. Translation of section from "The Flow of Gases in Furnaces." Importance of careful design of roof slope so that a proper flow of gases is maintained, avoiding "pocketing" of partially cooled gases, resulting in damage to the material being treated. Diagrams showing faulty designs used and the correct design necessary to rectify the faulty conditions. Roof and hearth should drop toward charging end. Long furnaces for uniform heating of long parts (shafts, etc.) should have the roof rise toward end where waste gas port is located. W. E. GROUM-GRJMAILO, *Iron Age,* 8-24-22, 2500 w. 8 figs. APS.

Economy Features of Electric Foundry. Proper location of the electric furnace and the supply bins. Hand charging of furnace is most economical for furnace, less than 3 tons, using scrap of a shoveling type. Handling of refractories and electrodes. The care, inspection and storage of electrodes. Advocates a quick test laboratory. CHARLES WELLMAN FRANCIS, *Iron Age,* 8-3-22, 1800 w. APS.

Boiler Plate. Increase in strength at room temperature resulting from cold-reduction of 12.5% is about same as that produced by half this reduction at blue-heat. This, in general, is also true at temperatures up to 295°C. Above this temperature increase in strength resulting from blue-deformation is somewhat less than that from cold rolling. "Blue-reduction" of twice the amount does not increase strength at room or elevated temperature proportionally. At 245°C strength of blue-worked steel is little in excess of that hot-rolled. Maximum tensile strength of steel subjected to 6.25% blue-reduction is obtained at blue-heat (295°) and shape of tensile strength versus temperature curve is similar to that for cold-rolled steel. Increase in limit of proportionality at room temperature resulting from 6.25% blue-reduction is greater than that obtained from twice as much cold reduction. Annealing for 30 min. at about 730°C completely removes effects of blue deformation. H. J. FRENCH, *Chem. Met. Eng.,* 8-2-22, 2500 w. CJW.

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Building Boom Increases Furniture Sales

RECENT prophecies in regard to the favorable effect the building boom would have on the furniture industry appear to have been justified. According to *Dun's Review* the demand not only for household furnishings but also for store and office furniture has shown an increase since the beginning of the year. Factory operations now range from 75% to full capacity.

Manufacturers' prices are reported to be about 25% below the levels of 1921. Although some manufacturing centers do not expect any great price changes in the next six months it is probable that if they do occur they will be upward rather than downward, since lumber prices have stiffened and there has been little reduction in labor costs. Manufacturers selling to the middle and high-grade trade who have been less affected by conditions than have those producing the cheaper grades are doing a very satisfactory business. The demand for medium grade goods has in some cases exceeded the manufacturer's supply and is expected to continue to increase.

Dealers report an increasing volume of business and a much greater tonnage than they had a year ago. They believe that the present conditions indicate a steady improvement in the future.

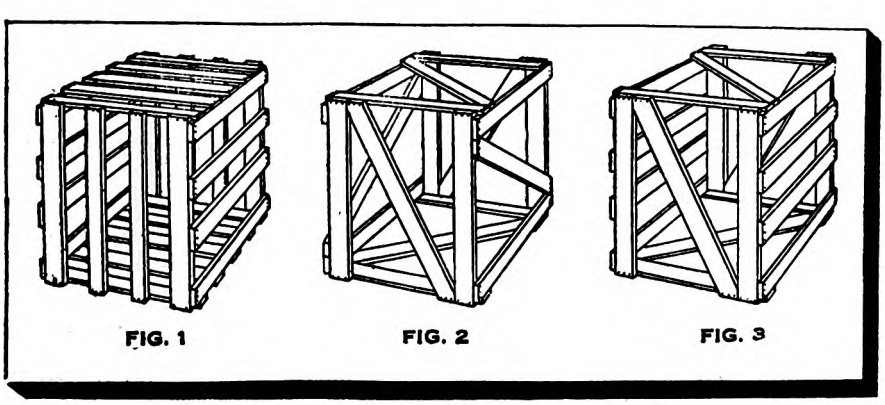
Comparative Strength of Wood. 150,000 comparative strength tests on kiln-dried and air-dried specimens of 28 common species of wood show that good kiln drying and good air drying have the same effect upon the strength of wood. Belief that kiln drying produces stronger wood than air drying is usually result of failure to consider differences in moisture content. Appearance of dried wood is not reliable criterion of effect the drying process has had upon its strength. Same kiln-drying process cannot be applied with equal success to all species. Forest Products Lab., Technical Note 180, 8-1-22, 400 w. CJW.

Durability of Woods. Following table shows relative durability (resistance to decay) of untreated woods:

Conifers	
Cedar, Eastern red (juniper)	150-200
Cedar, Southern white	80-100
Cedar, other species	125-175
Cypress, bald	125-175
Douglas fir (dense)	75-100
Douglas fir (ave. mill run)	75.85
Fir (the true firs)	25-35
Hemlock	35-55
Larch, Western	75-85
Pine, jack	35-45
Pine, longleaf, slash (Cuban)	75-100
Pine, Norway	45-60
Pine, pitch, sugar	45-55
Pine, shortleaf	60-80
Pine, So. yellow (dense)	80-100
Pine, Western white	65-80
Pine, white	70-90
Pine, Western yellow, pond, loblolly, lodgepole	35-50
Redwood	125-175
Spruce, Engelmann, red, Sitka, white	35-50
Tamarack	75-85
Yew, Pacific (Western)	170+
Hardwoods	
Ash	40-55
Aspen	25-35
Basswood	30-40
Beech	40-50
Birch	35-50
Butternut	50-70
Catalpa	125-175
Chestnut	100-120
Cottonwood	30-40
Elder, pale	25-35
Elm, cork (rock), slippery	65-75
Elm, white	50-70
Gum, black, cotton (tupelo)	30-50
Gum, red	65-75
Hickory	40-55
Locust, black	150-250
Locust, honey	80-100
Magnolia, evergreen	40-50
Maple	40-50
Mulberry, red	150-200
Oaks, red oak group	40-55
Oaks, white oak group	100
Oak, chestnut	70-90
Osage orange	200-300
Poplar, yellow	40-55
Sycamore	35-45
Walnut, black	100-120
Willow	30-40

The durability of commercial white oak is taken as 100%. Individual timbers of same species may differ considerably in durability. Sapwood of practically all species has very low durability. Forest Products Lab., Technical Note 173, 8-1-22, 500 w. CJW.

Chestnut. Service records collected by U. S. Forest Service indicate that chestnut poles, posts and ties, cut from blight-infected trees, are as durable in service as similar timbers cut from healthy trees. Blight fungus attacks living trees and grows in bark, but it does not penetrate deeply into wood itself. Blight-killed chestnut should be cut and utilized as soon as possible. Forest Products Lab., Technical Note 174, 8-1-22, 250 w. CJW.



Illustrating "Rigidity in Crates" digest above.

Rigidity in Crates. Diagonal bracing on six sides (Fig. 2) has been found to give crate maximum rigidity for minimum amount of lumber. These are more rigid than Figs. 1 or 3, though Fig. 3 is more rigid than Fig. 1. Crate with ordinary sheathing might withstand as great a load, but distortion caused by that load would be greater than in crate with diagonal braces and would ordinarily be great enough to allow damage to contents. Forest Products Lab., Technical Note No. 172, 8-1-22, 400 w. CJW.

A substitute for cardboard and wood in boxes is a chemical composition of sawdust and ashes. The finished boxes are light, washable, sanitary and non-poisonous. They are waterproof and as fireproof as asbestos and can be made in any degree of flexibility or texture, either as hard as oak, tough as metal or pliable as cardboard. A pound of the substance from which the boxes are made costs not more than five cents.—*Steam Shovel and Dredge Mag.*

A new stump-burning method employed in Washington consists of placing an apparatus against the stump with a flue and blowpipe in position. A draft created by the blowpipe turns the inside of the stump into a mass of coals, the fire eats down into the roots and the entire stump is consumed at half the cost of former methods.—*Steam Shovel and Dredge Mag.*

The first sawmill within the Arctic Circle will soon be established at Herschel Island, at the mouth of the Mackenzie River. The engine accompanying the mill is of the two-cycle kind, without carburetor or ignition, and can be run on fish oil or crude petroleum from the Fort Norman wells.—*Steam Shovel and Dredge Mag.*

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MACHINERY

Rise in Machine Tool Prices Predicted

THE consensus of opinion among the majority of papers in the machine field appears to be that the outlook for machine-tool sales is encouraging. Higher prices are predicted by *Machinery*, as a result of advancing prices of steel. A similar opinion is held by *The American Machine and Tool Record*. This publication believes that it is a short-sighted policy to defer purchasing of machine tools, because, as business picks up, the available mechanical labor necessary to build these tools will be absorbed by the other industries and the bid the machine-tool builder will have to make will be much higher. That many manufacturers are taking this view is indicated by the tendency now shown by many of them to advance their own prices in keeping with rising costs.

Iron Age believes that the general business recovery will soon be reflected in the machine-tool industry, and *Iron Trade Review* points out that the settlement of the railroad strike is practically certain to result in increased prosperity for the machine-tool industry. It is pointed out that since early this summer numerous railroad lists have been held up pending a strike settlement, and that once their labor difficulties are settled, the railroads are likely to become active factors in the market.

This fact is said to be indicated not only by present pending lists and large purchases reported recently in some quarters, but by their improved financial status, as compared with other years, and their ability and willingness to close on relatively large lists of other equipment. It is believed that the unusually heavy traffic which in all probability will tax their facilities over the next few months will also have a favorable influence.

Tooling Vertical Turret Lathes and Boring Mills. A chapter in the authors' forthcoming book. Takes up the points of importance in the design of chucks and face plates for these machines. Also special pictures for holding irregular work. Although specially for turret lathes, the principles back of the tools described is applicable to other tools for other machines, and consequently will interest all machinists and tool makers. A. A. DOWD and F. W. CURTIS, *American Machinist*, 6-15-22, 4100 w. MAH.

Head Sheaves. Study of stresses and design. Excessive weight, especially in rim of head sheaves, causes slip in rope. This wears rope and pulley rim. Packing not satisfactory, as it wears out rapidly. By careful calculation it can be determined whether rope will slip on sheave. Example of such calculation given. Each pulley should be designed to suit actual conditions under which it is expected to work. General discussion of design and manufacture of pulleys. J. S. WATTS, *Coal Age*, 7-27-22, 2000 w. CJW.

Milling Graphite. Description of new plant at Stockertown, Pa. New features of plant are: Use of reinforced concrete and steel in construction, introduction of individual electric motor drives in place of annoying steam-driven line shaft, and division of plants into three distinct units, installation of conveyors and elevators so as to avoid manual handling of material, increasing proportion of ball mills and making corresponding decrease in proportion of horizontal Buhr stones, discarding all bolting equipment and using air separators for sizing product. Illustrated description of these features. A. B. PARSONS, *Eng. Mining J.-Press*, 8-19-22, 3000 w. CJW.

The Operation of Fans in Parallel. In previous discussions on the operation of fans running in parallel, it was always assumed that the fans should run at the same speed. It was also expected that two duplicate fans operating in parallel, but at no increase in speed, would draw a greatly increased volume of air from the mine. This paper suggests a useful field for the operation of fans in parallel, for by controlling the power developed, instead of the speed, we can quite conveniently add to the power of the existing ventilating apparatus. At times when less air is required, only one of the fans need be operated. JOSEPH PARKER, *Coal Industry*, 8-22, 750 w. CJW.

Dyeing and Bleaching Apparatus, II. Monel metal has attained widespread popularity. Consists of 67% nickel, 28% copper and 5% other metals. Extremely strong and non-corrosive. Retains a high polish, is extremely tough, ductile, and is readily welded or brazed. May be used with acid, basic, mordant or sulphur dyes. Should not be used with bleaching powder, but may be used with sodium hypochloride or peroxide baths. Finds extensive use in washing, scouring, carbonizing and crabbing. H. GRANDAGE and W. E. HADLEY, *Am. Dyestuff Reporter*, 7-31-22, 1000 w. CJW.

Testing Rock Drills. Factory tests generally made to determine following points: Drilling speed, air consumption of machines, number of blows delivered per minute by piston of machine, force of blow delivered by piston, wearing qualities of materials used, and operation of machine in general. Illustrated description of various machines for these tests. R. J. DAY, *Eng. Mining J.-Press*, 8-19-22, 2000 w. CJW.

Wire Rope Lubrication. Brief discussion on the lubrication and care of wire ropes. This is divided into three main heads: The selection of the proper grade and construction of rope for the job in hand. The actual care of the cable under working conditions as to the proper arrangement and sizes of sheaves, drums, tackle blocks, etc., and lubrication. The first two of these are usually taken care of when the plant is installed, but proper lubrication is often neglected. J. K. BRODERICK, *Coal Industry*, 8-22, 750 w. MAH.

Two-Suction Refrigeration Machines. Two suction machine enables operator to hold lower temperature at one place than another. In practice it is seldom that more than two suction pressures are carried. Examples in practice of the use of two pressures are in the case of ice-making and in ice-cream plants. In Windhausen method, low pressure gas is compressed in one end of cylinder to pressure just sufficient to make it pass into suction of other end of the compressor, where it mixes with the high pressure suction gas. Another method is usually spoken of as multiple effect compression system devised by Voorhees. In this the ordinary compression stroke will draw in gas at lower pressure until end of stroke, and then connection is made to second suction line, holding the higher pressure, holding higher pressure by piston uncovering ports in cylinder at or near end of the suction stroke. H. J. MACINTIRE, *Power*, 8-22-22, 800 w. CJW.

Ring Filling Frame. Fine filling is being made on ring frames up to number 100s very successfully. Fairly good speed is available when using small rings, light traveler, short transverse and when things are properly set. For number 100s filling, rings should not be over 1 in. and bobin transverse not over 5 in. Stock must be well mixed, evenly fed to pickers, well-cleaned without overbeating. On fine work and long staple cotton beaters should not be run over 1000 rpm. Other details for successful operations given. H. D. MARTIN, *Canadian Textile J.*, 6-6-22, 800 w. CJW.

Methods of Machine Tool Design. In this article, the third and last of a series, the various types of machine-tool gear drives are given and then are described in some detail. A number of rules applicable to machine tool drives are given. A. L. DELEEUW, *American Machinist*, 6-1-22, 4350 w. MAH.

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Metal Markets Quiet

ACCORDING to *Iron Trade Review,* no signs of a buyers' panic or an important marking up of prices for the principal nonferrous metals (copper, zinc and lead) have appeared. This is believed to be due to the fact that production of these metals has not been materially affected by the fuel or rail strikes. There has been no important suspension of operations, either by producers or consumers. At no time since the armistice have the copper, zinc and lead industries occupied so strong a *statistical* position as at present. Each month, for more than a year, shipments of these metals have exceeded production, until now producers have less than normal supplies on hand and are handicapped by labor shortage. After-war stocks of new metals and scrap have also been depleted.

In recent months manufacturing consumers have been reluctant to contract heavily for forward requirements, in view of uncertain industrial conditions due to the coal and rail strikes, so purchases have been to a large extent for early needs. Meanwhile, consumption has been maintained at a high rate.

Domestic consumption of copper is said to be proceeding at a rate of 25% in excess of the pre-war rate. It is estimated that more lead will be used in 1922 in the paint and cable trades than in any previous peacetime year. Consumption of zinc by the roofing, battery, brass and galvanizing trades has been steadily gaining. The metal industries are looking forward to a large volume of unfilled requirements, with relatively small supplies to draw upon.

Lead—From a Human Interest Point of View. In order to awaken the interest of its many employees in the factory output, the Western Electric Company is having a series of articles prepared on the various materials which are used in large quantity. This is the first, and is on lead, which is used mostly as a covering or protective sheath for lead-covered cables. It brings lead down from the earliest mention to present date, outlines pioneer mining done in France and present-day methods in this country, the earliest crude furnaces and those used now, tells of the huge influence exerted by the use of the diamond drill on lead mining, of the numerous steps in lead mining and refining, all from a human-interest standpoint. R. H. FAUQUIER, *Raw Material,* 6-22, 4000 w. MAH.

Silver-Lead Smelting. Discussion of the evolution of mechanical roasting in silver-lead smelting. First introduced in the 90's. Dwight-Lloyd sintering machine has revolutionized methods of smelting and has so added to capacity and assured continuity of operation that, were it not for this improvement, industry would have been handicapped recently to the point of extinction. Supplementing these operations, nothing must be lost. Flue dust from blast furnaces is caught in bag house, that from roasters and sintering machine in Cottrell electrostatic treater. L. S. AUSTIN, *Mining and Metallurgy,* 8-22, 1200 w. CJW.

Lead Smelting at Trail. Important changes in recent years include double sintering by Dwight and Lloyd machines of large percentage of blast furnace charge and consequent elimination of pre-roasting in Wedge roasters. Use of granulated lead blast furnace slag. Percentage of lead in charge has varied greatly, being as low as 12%, while at present it is around 28%. There is very little copper in the charge. Addition of slag had very beneficial effect on physical condition of sinter produced, and increased net tonnage smelted approximately 33%. J. BUCHANAN, *Canadian Mining J.,* 8-11-22, 1000 w. CJW.

Study of Aluminum and Zinc Alloys. Résumé of a highly technical paper presented before the British Institute of Metals recently. It is a real contribution to the literature on the metallurgy of these metals. Authors go into chemical composition and method of checking and proving same very thoroughly, showing a marked preference for nitric acid reagent. Advantages of annealing for prolonged periods is treated exhaustively as is the peritectic reaction, and the constitution below the eutectoid line, evidences of chemical compound, similarity in character of the aluminum-zinc alloy micro-structure to troostite, and the rate of hardening at lower temperatures. D. HANSON and M. L. V. GAYLER, *Raw Material,* 6-22, 5900 w. MAH.

Art of Alloying. This paper contains methods of production, by fusion, of the technically possible and impossible alloys. It contains synoptical figures, an account of mixed crystal formation, and their importance, and describes the appearance of compounds and their effects. It refers to physical properties as affected by increasing miscible ratios. It furnishes a chart for constructive purposes and the design of utilizable alloys. W. GUERTLER, *Brass World,* 8-22, 3500 w. CJW.

Corrosion of Lead Pipes. Salt solutions attack lead forming lead carbonate when exposed to air. Sodium carbonate was most corrosive salt tried. Presence of ammonium nitrate seemed to inhibit initial corrosion by formation of protective coating of lead oxide over surface, but this inhibitive action may be only temporary. Soils of Winnipeg district have decidedly corrosive action on lead, nature of corrosion being that of crater-like pitting of surface with deposit of lead sulphate or carbonate in neighborhood of pitting. Various theories accounting for corrosion given. W. N. SMITH AND J. W. SHIPLEY, *Engineering J., 7-22,* 5000 w. CJW.

Die Casting Methods. The plunger type is still used to a certain extent. Other types have belt driven machines which by the use of gears and cams operate the dies back and forth. Steam is also used to drive the cylinders. Metals used in die casting, and the great value of this method in eliminating or reducing certain machinery operations. The applicability of this method is not fully appreciated by manufacturers and frequently, if they have foundry facilities, they sand cast, snag and tumble, drill, ream, broach, mill, jig, thread, etc., where at least part and perhaps all of these operations could be wholly or partially eliminated by die casting. A. M. BREWSTER, *Brass World, 7-22,* 1000 w. APS.

Contraction in Tube Welding. In butt welding of parallel or conical tubing, common distortion consists in a distinct inflection or groove on each side of the line of welding and gives very unsatisfactory finish to the joint. This may be eliminated by expanding the ends of the tube, previous to welding. The amount to which the tube should be expanded can be calculated or determined from practical results. M. PIETTE, *Welding Engineer,* 8-22, 750 w. CJW.

Protective Coatings of Sprayed Metal. Recent developments of the Schoop process abroad in depositing films of zinc, lead, aluminum, copper, tin, etc. Instead of a gas burner an electric arc does the melting in a new type of "pistol," so that refractory metals like molybdenum and tungsten in addition to those already mentioned may be used. The chief use at present is for galvanizing either charges of small articles like nuts and bolts, or whole structures like transmission towers, bridges, etc. Iron containers for chemical plants are coated with aluminum, lead or copper, calenders for textile works are coated with brass, paper is coated with zinc and used to wrap telephone cables, etc. ROBERT G. SKERRETT, *Iron Age,* 8-3-22, 2500 w. APS.

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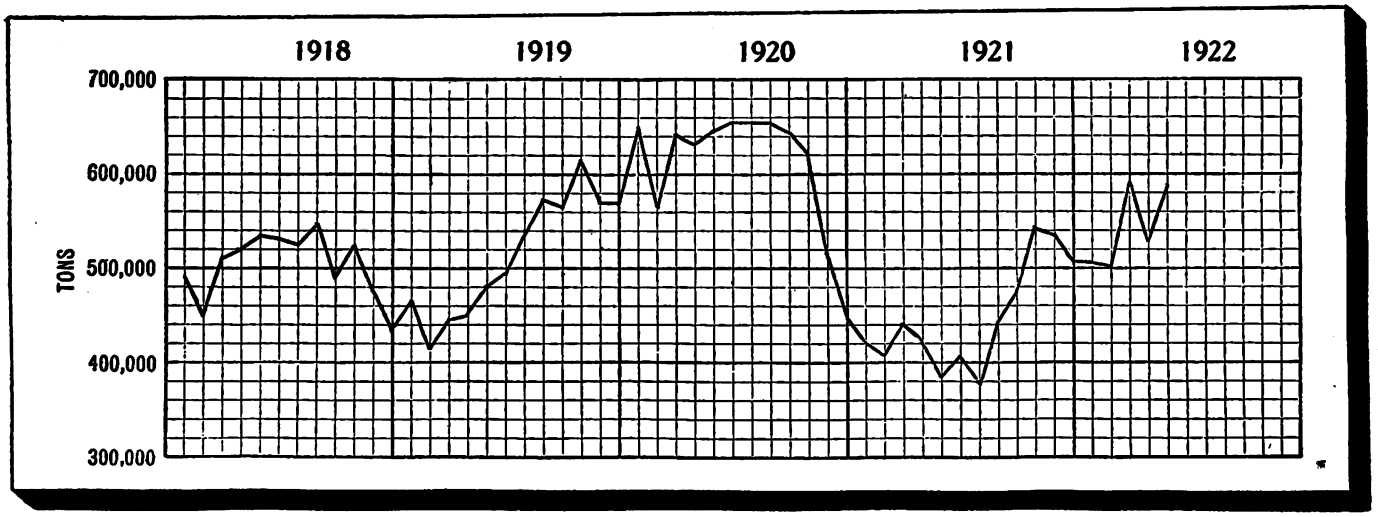


Higher Prices for Paper Predicted

ACCORDING to *Paper Industry,* the demand for paper is steadily increasing. Manufacturers are reported to be booking a larger volume of business in various kinds than at any time since the boom which followed the war.

The Pulp and Paper Magazine of Canada states that the tendency of prices is still toward higher levels. What is probably the most important development in this connection this week has been the rise in the prices on some grades of book stock. This increase in the price of coated book is the first advance in book papers in a long time. "In fact," says this publication, "the trend of quotations on this commodity has been downward for such a lengthy period that many in the trade were beginning to wonder whether book papers would ever move in any other direction in price."

As publishers' requirements expand, mills are securing more orders than in many months. It is pointed out that book papers are one of the best barometers of general business conditions in the paper field, inasmuch as the bulk of book stock consumed goes into magazines and trade periodicals, whose advertising depends on the degree of business activity in the fields they cover.



Paper production is approaching the high level reached in 1920. The chart, showing the trend of production since 1918, serves to bear out the contentions of the publications quoted at top of page.—*(The Woodlands Section.)*

Groundwood and Waste Paper. No machine in use which can work up pulp dried sheet pulp properly and rapidly without numerous handlings. There is machine patented as combined shredding, washing and bleaching beater which does this almost instantly. Working up of ground wood considered from point of view of use for board or low-grade papers or for fine or semi-fine papers. In former, main purpose is to incorporate as much groundwood as possible. In latter added to reduce cost, make up for excessive transparency of paper made entirely from chemical pulps and help to give sheet softness, opacity and bulk required for printing and demanded by usage. E. ARNOULD, *Paper Ind.,* 7-22, 1200 w. CJW.

Fire Prevention in Pulp Wood. Spray nozzles have undoubted possibilities for cheap and effective log-pile protection. Experiments under way indicate that two quart heads spaced 30 feet each way and elevated 5 feet above surface of pile will give satisfactory service with pressure of from 50 to 70 pounds at head. Half-inch branch pipes feeding 5 to 8 heads appear to be large enough. The main feed pipes should be large enough to supply monitor nozzles and to keep down water velocity, to prevent keeping sediment which would clog nozzles in suspension. Such wetting of large piles of wood, wet when stacked, will not increase rotting, but rather reduce it. Wood which is to be kept dry had best be piled in low, well-separated piles with good hydrant protection. H. J. HOXIE, *Paper Mill,* 7-15-22, 2000 w. CJW.

Automatic Piling Cutter and Creaser. Importance of adjusting cylinder and jacket pointed out. With standard rule, easily avoid adjustment which causes endless confusion for every cutter and creaser manufacturer and which must be very annoying to every user of cylinder cutters and creasers. Today each user of cutting rule has his own particular height; 0.923 in. suggested. Directions are given for adjusting Babcock machines and for make-ready. F. S. ENGLISH, *Carton Age,* 7-22, 1000 w. CJW.

Slowness Tester. In beating of paper stock, slowness is one of important properties to be either developed or obviated, according to character of paper desired. Green has considerably improved his tester in point of convenience in handling and durability of construction. Apparatus described and illustrated. A. B. GREEN, *Paper Mill,* 7-1-22, 1000 w. CJW.

Lime in Sulphite Industry. Two ways of preparing bisulphite liquor are by passing sulphur dioxide gases through water in which base is suspended or by bringing gases in contact with large lumps of carbonate of base, which are moistened by continuous flow of water (Milk of lime and Tower systems). Claims of two methods discussed. Best lime for sulphite industry is that which contains high per cent of magnesia. Should be as free as possible from iron and other impurities and should be well burned. Air slaked lime should be avoided, since moisture is likely to vary and it would be difficult to maintain uniform proportion of base in acid. P. A. PAULSON, *Paper Mill,* 7-8-22, 1200 w.

Pulp Grinder Regulator. Description of Westinghouse Automatic regulator installed by Crown-Willamette Paper Co. Motor-operated hydraulic element consists mainly of a motor opening and closing valve placed in main water pressure line which in turn controls pressure in grinder cylinders to be operated. By addition of two extra current transformers placed ahead of total mill load one can operate and regulate whole mill load, keeping total load as even as possible. Operation described by diagram. C. E. BRAUN, *Paper Mill,* 7-23-22, 500 w. CJW.



Power Plant Engineering. Continued article. General discussion of apparatus, such as superheaters, economizers, drafts, etc. Steaming rate of boilers, development of steam turbine, condenser equipment, object of recording power plant performance and importance of skilled operators. W. G. DIMAN, *National Engineering*, 7-22, 500 w. CJW.

Superheated Steam. Most logical step for increasing efficiency of engine and means whereby practically all parts of power plant are improved and made more effective in operation is use of superheated steam. This is because it has much lower thermal conductivity than saturated steam, has a larger volume per unit of weight and it behaves like a perfect gas and does not begin to liquefy until its temperature falls to that of saturated steam at same pressure. High-degree superheat is of vital importance in steam turbines, which are particularly adapted to its use. Generally speaking, reciprocating engine will be benefited more by superheat than steam turbine will. Description of plant at Hell Gate of United Electric Light and Power Co. R. A. HOLME, *Eng. World*, 7-22, 2000 w. CJW.

More Power from Your Coal. Scale-encrusted boiler tubes are cause of great heat loss, often reducing conductivity to half what it should be. Covers equipment and methods of cleaning tubes, recommending use of compressed air equipment. *Rock Products*, 8-26-22, 2000 w. CS.

Electric Power About the Blast Furnace. Processes about the blast furnace which require the use of power are blowing, pumping, material handling and accessories. Article deals with the application of electric power to these processes. Necessary characteristics of motors used for these purposes are indicated. Advantages and disadvantages of AC motors for the blast furnace ship-hoist are explained in detail. G. Fox, *Electric J.*, 9-22. IG.

Power System. Three sources of power for paper mills; purchased power from central station, generated by whatever source is available; manufactured water power from chartered development or rentals of water used; manufactured steam power, manufactured in connection with steam plant used for process heating or drying. Of these, manufactured steam power will be found to be cheaper in almost any case. If mill is operated by purchased power or by combination of water and steam power, all electric drive will be desirable in nearly all cases, owing to flexibility of system in which balance of power or shift from one source to another can be obtained at ease without interference of operation. Losses in efficiency may occur in purchase of fuel, handling and storage of fuel, combustion of fuel, generation of steam, utilization of heat and distribution of power. Power costs in general could be reduced at least 35%. J. F. FERGUSON, *Paper Industry*, 8-22, 2000 w. CJW.

Heating of Water and Other Liquids. Six ways of heating water and other liquids by gas are discussed. First or primitive method is to heat a piece of iron or stone and drop it into the water. Second, is to put the pot of water directly over the gas flame. Third, is to heat water in a storage tank through circulation of the water through the water heater. Fourth, is to heat the water instantaneously as it is drawn through the heater, there being no storage tank. Fifth, is to heat water by means of steam; and sixth and last, is to burn the gas within a pipe or other container which is immersed in the water. Detailed descriptions of all these various methods are given, and all the newer important commercial developments are given. The use of cast iron against copper is discussed. The ideal absorber is also discussed. The instantaneous and the storage systems are compared. Particular attention is given to the immersion type of water heater. T. KING, *Am. Gas J.*, 8-19-22, 6000 w. IG.

Steam Turbines and Electrical Drives for Vital Auxiliaries. Discussion by engineer of the Westinghouse Electric and Manufacturing Company, showing that the co-ordinate use of steam and electrical units assures continuity of operation and economical heat balances. For certain vital auxiliaries complete dependence on one source of power is to endanger the operation of the entire plant through failure of one source of power. This applies to pumps especially. LINN HELANDER, *Blast Furnace & Steel Plant*, 8-22, 3500 w. APS.

Diesel Engines for Small Plants. The Nordberg Company, prominent builders of very large-sized Diesel engines have now placed on the market a new small H sized design of 110 h.p. per cylinder, and available in three, four, five and six-cylinder forms. This has been done in the belief that the growing popularity of the Diesel is due to a realization of its many advantages, not the least of which is fuel economy and the use of a very low-grade oil as fuel. The article describes this new design, using the four-cylinder unit for illustrative purposes. *Power*, 8-1-22, 2550 W. MAH.

Safety Appliances in Boiler Plant. Description of PBH quick-closing, chain-operated water gauge and cock and gauge glass protector, Hays differential draft gauge, Hays gas analysis instrument, and the Hays CO_2 and draft recorder. These instruments effect large savings in fuel in power plants. W. C. EDGE, *Paper Ind.*, 9-14; *Paper Trade J.*, 8-14-22, 1500 w. CJW.

Bearing Design and Lubrication. General discussion of bearing design and lubrication of bearings. The action of the oil film is explained. The application of the lubricant, methods of cooling, oil protection, bearing losses and temperature, insulation of bearing pedestals, protection from dust, dirt and scale are discussed in the article. W. FOOT, *Electric J.*, 9-22. IG.

Refrigeration and Air Conditioning. Continued, general article on subject. Discusses determining surface required, regulating quantity of ammonia, compressors, condenser (atmospheric type, double pipe and flooded type) and receiver tank. A. W. LISSAUER, *Candy Manufacturer*, 7-22, 1800 w. CJW.

Foreign Gases in Refrigerating Systems. Air may be result of leakage from vacuums at times of repairs. Other gases may be due to impurities in ammonia or to unsuitable lubricants. These gases accumulate in high-pressure part of ammonia system. They increase the pressure in the condenser by the amount of their partial pressure in same way as in example of air mixed with steam. This cuts down efficiency of system. Gases also get between ammonia vapor and cooling surface of condenser, preventing their being cooled. Gases should be withdrawn from point in condensing system where temperature of gases and vapor is lowest. Even at risk of considerable ammonia loss, it is generally profitable to purge if there is any indication of foreign gases from comparison of temperature and pressure in condenser. T. M. GUNN, *Power*, 7-25-22, 2000 w. CJW.

Lubricating Requirements of Steam Cylinders. General need for lubricant in a steam cylinder is laid down first, and then the general requirements built up around this. Author tells when the cylinder is getting oil, the condition of the cylinder walls, signs of poor lubrication, atomization and very fine division of the oil particles. W. F. OSBORNE, *Power*, 8-1-22, 1600 w. MAH.

Chain Drives. Advantages of chain drive are: increased efficiency; positive as gearing, thus driving machine in exact ratio with speed of motor or driving shaft; suited for large reduction of speed from driver to driven shaft; adapted to either short or long distances between shafts; freedom from back-lash of gearing with its jerky motion and noise; protection against injury to attendants; can be run in either direction, at relatively high speeds; will transmit large amounts of power and reduces journal friction. *Textiles*, 9-22, 750 w. CJW.

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PRINTING PUBLISHING

The Value of the Big Newspaper

IS it advisable for newspaper publishers to conserve newsprint in view of the advancing prices, or is the large-sized newspaper necessary to build circulation and advertising?

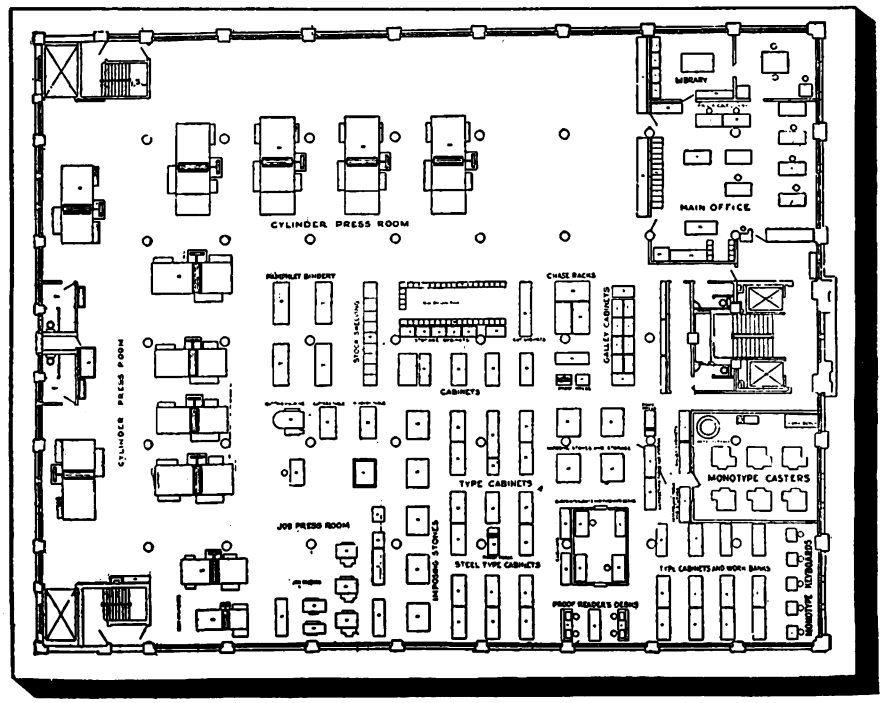
A writer in *Publisher's Auxiliary* states that even with country weeklies the tendency is toward larger newspapers. In the opinion of this publication, real circulation is built, not upon news stories and scoops, but upon special features. And it is pointed out that these features possess an equally strong appeal to the advertiser, who not only feels that such a paper has a following, but that the reflected importance given the pages by special features is carried into his own advertising.

However, *Editor and Publisher* states that the present tendency "toward papers overweighted with news and features" originated in the effort to maintain a "front" in the size of the papers when the support of advertising was lacking. A recent survey of the newsprint situation shows that although the number of text pages in New York newspapers for August of this year showed an increase over August, 1920, the volume of advertising was slightly less. However valuable the large-sized paper may be, there can be little doubt that a continuation of this policy will result in higher prices for newsprint in the near future.

The Platen Pressman. First printing press invented 1456. In 18th century first iron press introduced. Is basis of platen press today. Excellent method for operation of platen press is: remove tympan and packing used on previous form, adjust new tympan, select packing, which in all cases should be hard; adjust tympan again; make sure there are no wrinkles. Press now ready to receive form, which is always put on with quoins up, unless locked up otherwise. Before pulling impression, shift grippers so that they clear type and do not come in contact with bearers. Proceed to take impressions. Marking out of sheet most important step. Should be sheet of stock to be used on work. Always start on low spots and work toward highest on sheet. For spot up, use strong tissue paper. Apply paste sparingly. When complete stick top sheet with knife at extreme ends of type, open top tympan bale, place makeready sheet on third manila sheet, make firm by paste. Be sure sheet is in register with top sheet. JOHN J. DODD, *Amer. Pressman,* 7-22, 600 w. MBB.

Who Does the Printing? Printing first employed in about 900 A.D., by Chinese. Printing on papyrus reeds, beginning of printed paper, started by Egyptians about 4300 years ago. Ink was first made of "well-aged linseed oil boiled until viscous when cold, and mixed in a mortar with resin black." Rollers existed as "ink balls" with which pressman distributed ink over surface of forms. In 1810 leather rollers were made, beginning of present rollers. Primitive Chinese printing press was a stiff brush. In 1450 Gutenberg made a wood press. Nicholson, Englishman, invented first cylinder press 1790. About 1885 halftones were brought out. HUGH GORHAM, *Amer. Pressman,* 7-22, 2000 w. MBB.

Printing Inks. Printing ink consists of varnish and pigment together with considerable measure of applied research and technical experience. Linseed oil is most important for varnish making. Chinawood oil has but very limited application. Soya bean oil is an important substitute, but not as satisfactory as linseed. Rosin oil makes excellent varnish for black inks. Driers in most common use are linoleate, resinate and tungstate of lead, borate and resinate of manganese and acetate and resinate of cobalt. Natural colors—ochres, umbers and siennas—are noted for fastness to light and resistance to alkalis, acids and bleaches. Artificial colors—organic lakes, chrome yellows and iron blues—yield infinite variety of shades, have great color strength and work well in varnish. Various pigments discussed. Mixing consists in use of pony mixer and ink mill. Discussion of printing requirements and three kinds of printing inks—typographic, lithographic and depressed surface inks. New developments in printing machinery must be met by inkmaker. Paper stock also important factor. T. W. ANSTEAD, *Chem. Met. Eng.,* 8-16-22, 3500 w. CJW.



A print shop (Wm. F. Fell Co.) with everything on one floor.—*(American Printer.)*

Electrotypes and Nickeltypes. Differences between copper, nickel and steel-faced electrotypes largely those of purpose, price and durability. Copper-faced cost least. Satisfactory for ordinary black-ink printing, also neutral colored inks involving no chemical reaction. Nickel more durable, not subject to corrosion, ideal for color printing. In reality are no "steel" electrotypes; term designates nickel-steel-cobalt alloy of excessive hardness, suitable for prodigiously long runs. Nickel and nickel-steel yield inked content readily to impressions from perfect makeready. Copper displays tendency to cling to ink. Costlier plates usually cheaper in end. Lead-moulding better for fine halftones. Type forms can be moulded in wax only. Line plates can be moulded perfectly in wax, also halftones up to 133 line screen fineness. *Amer. Pressman,* 7-22, 600 w. MBB.

Supporting piers are now being made of paper in California. These piers are not subject to attack by the teredo. They are 60 feet in length and from 18 to 30 inches in diameter. A square steel cap is fitted over the top to receive the shocks of the pile-driver.— *Dearborn Independent.*

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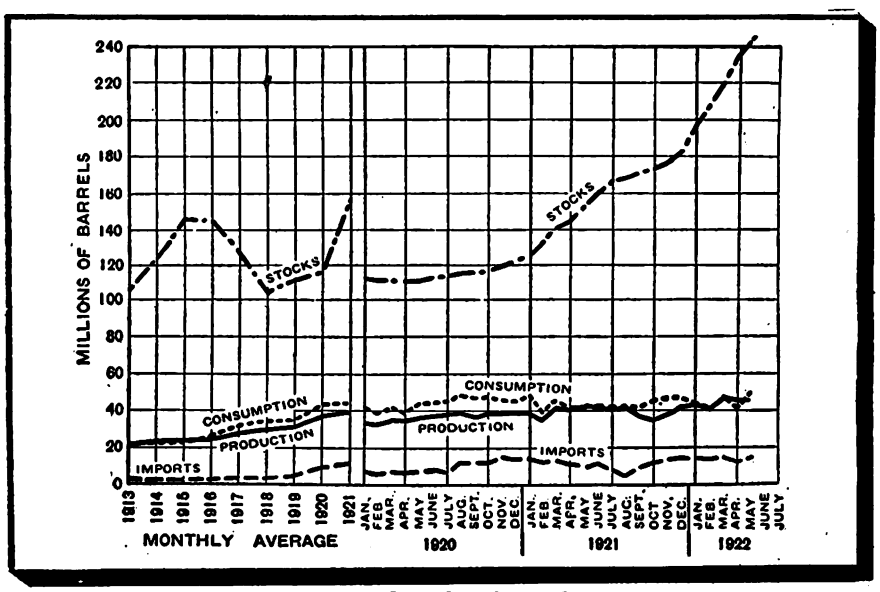
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OILS·PETROLEUM

Combination Fuel Advocated

ACCORDING to *Power,* the United States Bureau of Mines suggests that a simple mixture of fuel oil with fine coal, in as large a proportion of oil as the coal will absorb and hold, will be found useful as an emergency fuel. But in the opinion of many observers of the situation, the increased use of fuel oil will extend long after the present coal shortage. *National Pretroleum News* points out that the present coal crisis affords a great opportunity for the oil business to build up an outlet for its slow-moving fuel oil. The public, after going through two strikes and innumerable threats of strikes, is coming to realize the need for a fuel whose production is not continually affected by labor disturbances. At present, fuel oil is reported to be maintaining its strength and even stiffening a little in price. The demand is sufficient to absorb it about as fast as manufactured, and there are small stocks on hand. However, stocks of petroleum have shown a big increase over the past two years, especially since the beginning of 1921, as revealed by the accompanying chart. Although in the past the price of fuel oil has been largely compared with the price paid for crude at the well, a new tendency is now apparent. Refiners are watching the coal prices closely and basing their approach to possible new consumers on the relative cost of oil and coal, considering the heat value of the two fuels and the other relative merits.



Production, consumption, imports and stocks of petroleum in the U. S., by months, since January, 1920.—*(U. S. Bureau of Census).*

Vegetable Oil Industry. Considerable progress in solvent recovery. Various innovations have been presented for refining of oil and removal of free fatty acids. New bleaching carbons are more active than boneblack, but increased activity is offset by advanced prices. Hydrogenation seems to be pretty well standardized. New methods of measuring color of oils. Other problems. DAVID WESSON, *J. Ind. Eng. Chem.,* 9-22, 2500 w. CJW.

Shale Oil. Gasoline situation. Many of U. S. oil shale deposits will yield barrel of oil per ton of rock. American shales do not work satisfactorily when retorted in standard Scotch retort. First step is formation of solid or semi-solid bitumen, which then decomposes by secondary cracking process forming petroleum. Not yet possible to obtain heavy type lubricants, such as cylinder oil, but excellent lubricants of light body can be made. Shale residue may be used in producer to furnish gas for retorting of shales. By-products are discussed. R. H. McKEE, *J. Ind. Eng. Chem.,* 9-22, 2500 w. CJW.

Oil Shales. Entire State of Kentucky underlaid with oil shale of varying thickness and at varying depths. In places shale comes to surface. In this area 90,000,000 tons of shale amenable to steam shovel or quarry methods of mining. Figuring conservatively, this shale holds 40,000,000,000 barrels of crude oil. Two or three main products to be considered: crude oil, fuel gas and ammonium sulfate. Little work done on by-products. May be possible to find use for spent shale, though this problem has not been attackedfl Kentucky is logical place for the genesis of the shale oil industry in the U. S. C. A. CROUSE, *Chemical Age,* 8-22, 1200 w. CJW.

Absorption of Gasoline from Natural Gas. Methods of testing natural gas for gasoline content given. Compression and refrigeration method of extracting gasoline is profitable only with "wet" gas; that is, gas which is in intimate contact with oil and contains more than one gallon of gasoline per 1000 cu. ft. of gas. For treatment of "dry" gas, absorption process has been developed. History of process. Absorbent consists of high boiling kerosene of similar oil. Review of Bureau of Mines work. R. C. CANTELO, *Canadian Chem. Met.,* 8-22, 1500 w. CJW.

Rotary Drilling of Oil Wells with Electric Motors. Description of the application of electricity in drilling oil wells by the rotary system. The rating of the motor and other characteristics and details of the other electrical apparatus required are given. *Oildom,* 4-22, 600 w. IG.

New Method of Wax Extraction. Wax is extracted by a centrifugal process yielding a product which gives a lower cold test. Process is being operated on a commercial scale in plant producing 3000 barrels of petrolatum monthly. The details of the process are described. W. MILLER, *Oil News,* 8-20-22, 2500 w. IG.

Asphalts. Asphalt consists of hydrocarbons combined with sulphur and nitrogen and are also called bitumens. Most notable deposit of native asphalts is in Trinidad. These are hard and brittle, and for road binders must be mixed with heavy petroleum residues. Blowing with super-heated steam thickens the oil asphalt and are characteristically non-ductile when semi-solid. Methods of testing asphalts are given. These include melting point, penetration, volatility, ductility, etc. Constants are given. *Petroleum Age,* 8-1-22, 2500 w. CJW.

Low-pressure Absorption Plant. Report dealing with construction operating methods, many changes necessitated and difficulties encountered in recovery of gasoline from rich casing head natural gas by absorption at low pressures. Results of heat generated in absorption towers are particularly noted and possible means of overcoming undesirable effect of such heat is proposed. Cannot be abstracted properly in short space. W. P. DYKEMA and A. A. CHENOWETH, Bureau of Mines, Technical Paper 263 (1922), 42 pp. 10 cents. CJW.

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All Textile Lines Show Improvement

THE improvement in general industrial conditions continues to have a favorable effect upon the textile industry, according to *Fibre and Fabric*. The greatest difficulty in both wholesale and manufacturing channels is the narrow profit margin available and the sharp competition in securing business. But it is now confidently predicted that the present movement of textiles will continue for the balance of the year. The cotton goods markets are firm and sales have been more general. The yarn markets are slightly more active. Wool and worsted goods are selling well. The improvement in silk goods trading in the past two months has been steady, and while there is a great deal of complaint heard about high prices and narrow profits, nevertheless manufacturers expect to be kept quite busy during the remainder of the year.

The Southern Textile Bulletin quotes a prominent wholesale drygoods executive as saying that "Since the primary market has shown such a firm tendency, notwithstanding the dullness of the past month, it would indicate a strong market with every possibility of advances in the near future."

Although the loss of production in the textile mills, due to shutdowns and strikes, will undoubtedly be felt and certain lines of merchandise must necessarily be scarce, it is believed that if manufacturers will withhold unusual advances and bring their levels up gradually to a basis of cost plus a reasonable profit, the closing months of the year will prove very satisfactory to the jobbing trade.

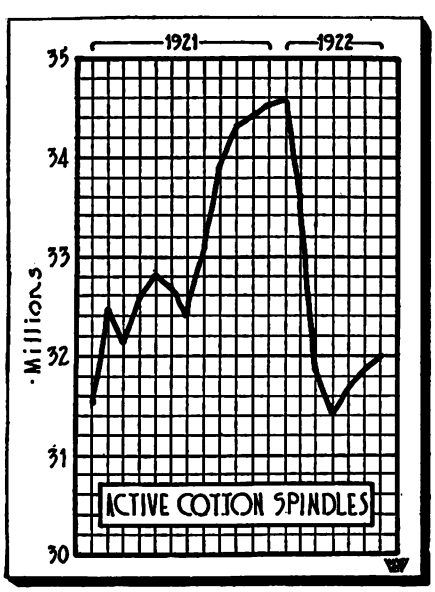
Cotton

Heat and Yarn. After period of one hour, cotton heated in a moist heat at 140° C is reduced in strength. Color is changed after one hour at 120-140° C. Cotton heated in a small vessel containing the moisture of hydration is weakened more than that heated in the dry heat of an oven. Yarn heated at 190° C for one hour in an open electric oven had much the same color as a yarn heated the same time at 140° C in a closed vessel of limited volume. *Southern Textile Bulletin*, 9-7-22, 1200 w. CJW.

Doubling and Winding. Doubler occupies very important position between spinner and manufacturer. Can produce wide variety of yarns so suitable for almost every type of goods. Discussion of various types of machines. Most important development in doubling industry has been large increase in use of cotton yarns folded 12 and even 9 ends up and used for cotton belting, canvas for conveyors, cotton hose, brake materials, stair treads, etc. WALTER BAILEY, *Southern Textile Bull.*, 7-6-22, 1200 w. CJW.

Elastic and Non-Elastic Narrow Fabrics. Continued article. Where sunken effects are desired, it is necessary to uniformly distribute buried stock just as it is in fancy loom method. Illustrated by patterns. Too much emphasis cannot be laid on necessity for exercising care in jacquard tie-up and leveling of strings. Some form of adjustment should be used for raising and lowering jacquard machines to compensate for expansion and contraction of strings caused by changing atmospheric conditions. Advisable to weave buttonholes. This is accomplished by use of two banks of shuttles, both running in same direction at every pick of loom but only upper one of which is engaged with cloth while plain part of goods is being woven. When buttonhole is about to be made, two distinct sheds are formed and then two banks of shuttles are engaged. Making abdominal belts is same as plain web, except that it is woven in deep front reed made to taper from top to bottom, from fine to coarse. Printing of designs on elastic webs is form of embellishment which opens up large possibilities for variety of effects. Diagram of machine for this purpose. SAMUEL BROWN, *Textile World*, 7-15-22, 2000 w. 7 Fig. CJW.

Odd Lots of Yarn. If excess yarn is large enough, new patterns may be designed with direct object of working off this odd lot. If only limited amount is available it may be used with profit in weaving checks. Odds and ends of warp bobbins may be worked off for the defining lines in hairline fabrics. Double plain stripe pattern may be altered to check design by admittance of filling threads to correspond with warp. If clothing is old proportionate percentage of allowance must be made to compensate for imperfections in the card clothing. This may be 1% or more reduction of the wire working points for each year that card clothing has been in full operation. *Southern Textile Bulletin*, 9-7-22, 1000 w. CJW.



Cotton spinning activity is recovering.— *(Magazine of Wall Street.)*

Wool

Finishing Woolen Goods. This is an interesting study of the cleansing action of soap. Soap produces alkali in small quantity which neutralizes acid dirt and dissolves albumins; lowers surface tension to emulsify mineral oils, etc., and to rapidly wet or penetrate; for suds (emulsion of air), which indicates active soap, lubricates and cushions cloth layers, carries oxygen and removes dirt by agitation and buoyancy; and finally, breaks up and carries dirt from cloth (colloidal action) which is valuable on grease-free and oil-free dirt and which stabilizes emulsions and suspensions. *Textiles*, 9-22, 1500 w. CJW.

Action of Cards upon Fibers. For each fiber passing through the card there are at the least 1364 wire working points per fiber with which to perform service of carding the stock. All of these working points are acting together upon the stock in order to perform the triple process of carding, that is, that of combing the fibers straight, freeing the same from foreign matters and then delivering it into a strong enough sliver to be properly worked in the succeeding process. Layout shown of how to proceed to get all of the information regarding each make of cards in mill on specially printed form. Samples are given as suggestions as to methods possible to utilize odds and ends of lots of warp and filling that can be found in most any mill. H. D. MARTIN, *Southern Textile Bulletin*, 9-7-22, 1600 w. CJW.

Reversible Knit Fabric. Knit fabric with both sides having same appearance has been designed. The fabric is knit on circular knitting machine having radial and cylinder needles in operation at right angles. There are the same number of radial needles as cylinder needles. These needles are associated in pairs and disposed so that a radial needle passes very close to cylinder needle. This is great advantage in operation of machine as it gives operator clear view of all the needles. *Textiles*, 9-22, 800 w. CJW.

Electricity

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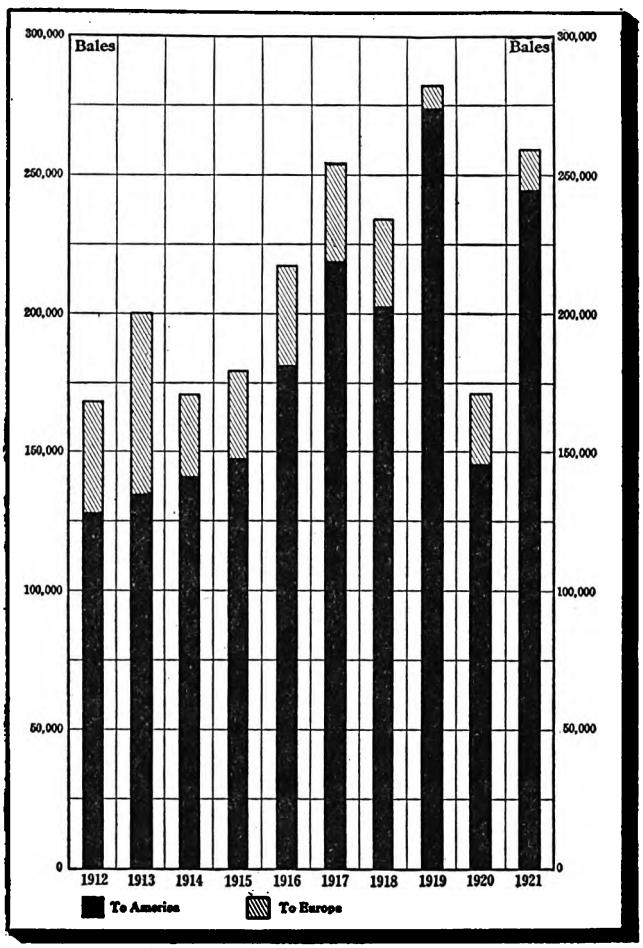
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Japan exports of raw silk to America and Europe, calendar years 1912-1921.

Water in Silk Weighting. Water to be used after treatment with tin should possess moderate degree of hardness, for soft water dissolves the tin salt. Hardness of a degree of 50 to 100 parts per million is satisfactory. Temporary hardness is preferable to permanent hardness. Water to be used after phosphate treatment should be as soft as possible. Advantages are that sodium phosphate bath is more readily maintained in state of purity and uniformity, less loss of phosphate and better preservation of luster and good quality of the silk. C. CAGLIOSTRO, *Color Trade Jour.*, 8-22, 400 w. CJW.

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General

Direct Colors. Direct colors find application in dyeing and printing of all classes of cotton goods, in paper staining, leather, linen and straw dyeing. Silk and artificial silk can be dyed with some of these products. They are strong dyes, giving, in many instances, clean and pure shades, and are very easy of application. By means of diazotization, new dyes may be obtained. Examples of such reactions are given. Stilbene dyes form one of the most important branches of these dyes. Their manufacture is rather complex. By attaching this molecule to various other bases colors of the type of benzo fast red and benzo fast scarlet are obtained. Other important dyes of this class are derivatives of naphthalene. C. GREENHALGH, *Am. Dyestuff Reporter*, 8-28-22, 1500 w. CWJ.

Turkey Red Discharge Styles. Goods intended to be dyed plain red for subsequent discharging must be well bleached. These goods are first padded in the usual way in a solution of 4 gal. special turkey red oil, 2 gals. tournante oil emulsion and 32 gals. of water. After drying and standing for 24 hours, the goods are steamed one-half hour at 4 lbs. pressure and padded in basic alum solution consisting of 36 gals. of water, 24 lbs. of turkey red alum and 2 lbs. of pure soda. After 24 hrs. the process is repeated. The goods are treated with chalk when they are ready for dye. Directions are given for white, blue, yellow, green and black discharge colors. The pieces are printed in the usual manner, aged to develop the black and are then ready to pass to the bleach vat for cutting. The alkaline process is used mostly for the black, yellow and white effect on turkey red ground. Many efforts have been made to apply direct colors, as also chrome coloring matters, in this style, but with unsatisfactory results. J. A. WILSON, *Am. Dyestuff Reporter*, 8-28-22, 1000 w. CJW.

Cloth for Finishing. Tallow should be free from paraffin, because paraffin or wax stains in finished cloth are objectionable Examples of such stains are given. Stains from pure mineral oil show up yellow in the finished product, but if the oil contains any metal the trouble is greatly aggravated. Attempt to remove these metallic stains by oxalic acid is a dangerous practice. Bleeding of dyestuffs in the bleaching process will always cause a lot of trouble. *Am. Dyestuff Reporter*, 8-28-22, 1800 w. CJW.

Textile Waste. First part discusses power house efficiencies. Saving may be effected in discharging spent dyebaths. Materials which may be recovered from textile waste waters are fibre, oil and grease, fertilizer, water, soap and scouring material. In some cases 1% of fibre has been recovered. Grease is best recovered by filter presses. New process of grease recovery is entirely mechanical. Other waste products such as scrap leather, canvas, etc., are mentioned. E. V. CHAMBERS, *Textile World*, 8-2-22, 2000 w. CJW.

Asbestos. Asbestos is silky, hard and dense non-metallic mineral. Not affected by heat and only to small extent by acids. Found in Canada, South Africa and Russia. Uses numerous. Most important are spinning and weaving asbestos textiles. Chief marketing points are New York and Hamburg. Production and consumption figures. Market requirements cover length, color and chemical composition, most important specification being length and strength of the material. Standard testing machine has been developed. Asbestos fiber divided into long spinning, medium and compressed sheet, pipe covering, shingle stocks, asbestos paper and millboard stock, cement stock and shorts. Average tests given. Prices undergoing adjustment. Consumption of raw asbestos among paper and millboard manufacturers consume practically all short material up to and including that valued at $70. B. MARCUSE, *Eng. Min. J. Press*, 8-12-22, 1600 w. CJW.

Shampooing Rugs. Dusting in some form an essential step. Scouring consists of brushing the surface thoroughly with soap suds by means of a rotary floor scrubbing machine, scraping off the excess soap and removing as much as possible of the cleansing solution with a vacuum, then rinsing and removing the rinse water in the same water. The rinse is often followed by a second rinse or a sour with acetic acid. Rug cleansing does not want too much standardizing, for rugs have individuality. Dry cleaning is not always sufficient to remove insoluble embedded matter. C. F. GOLDTHWAITE, *Am. Dyestuff Reporter*, 8-14-22, 1500 w. CJW.

Textile Plant Superheats Exhaust Steam for Process Work. This article describes an unusual process in a Pennsylvania finishing company, which adds heat to its exhaust steam to superheat it, and then uses it to dry cloth in a tentering machine. After this, the steam goes to drying rolls, where more of its heat is usefully used. High pressure steam was previously supplied to the tentering machine, and the present process shows a considerable saving. The article describes the plant, its layout, the superheaters used, and gives other interesting facts. *Power*, 6-30-22, 1200 w. MAH.

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(*From page 1614*)

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Advertising Needed in Textile Industry

MORE advertising should be done by the textile industry, says *Fibre and Fabric*. The American public likes nothing better than to be told about new fabrics, but in most cases this opportunity is neglected. Yet any mill can standardize a fabric or line and keep its looms running on the advertised goods. This would result in not only the sale of more goods but would eliminate the inconvenience and waste of time involved in changing the looms for the weaving of different materials.

* * *

One thing at a time will land your products in the lead a lot quicker than jumping from one idea to another—and being about six jumps ahead of the public all the time.—Thomas J. Kavanaugh, Oil News.

With the Financiers

(*From page 1622*)

eign trade. Exports have been increasing. The vast improvement in our export trade is not fully appreciated. United States exports for July were $296,651,030, a decrease of $22,059,339 from July a year ago. Exports for seven months ended July were $2,081,519,576. This represents a decrease of $701,015,470 compared with seven months ended July, 1921. But the real comparison is this. United States exports for seven months ended July, 1913, were $1,300,000,000; ended July, 1912, $1,200,000,000; ended July, 1911, $1,100,000,000.

"Analysis of import figures also throws light upon forthcoming activity in our domestic productivity. Imports of crude materials for use in manufacturing were $586,658,125 for the seven months ended July, 1922, compared with $497,207,330 for the corresponding period of 1921. Imports of manufactures for further use in manufacturing totaled $279,838,649 for the seven months of 1922 compared with $202,427,935 in 1921.

"These foreign trade figures not only foreshadow an increase of bank money in the shape of loans and discounts in the immediate future but also an increase of commercial paper, and account for the steady increase in the importance of the bankers' acceptance market. In both the business money market (commercial paper) and the bankers' acceptance market there are indications of more activity at slightly firmer rates in the immediate future, but before this can become noticeable there must be a greater increase in the volume of bank loans."

Strikes Did Not Check Automobile Output

THE automotive industry is one of the few that has witnessed increasing production and shipments during the prolonged strike period. Carload shipments of automobiles for the month of August were 32,563 in number compared with 29,116 in July and 20,758 in August, 1921.

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"It Must Not Happen Again"

(*From page 1616*)

working conditions he will accept employment, whether this acceptance is made individually or collectively.

"No man or set of men have any right, natural or legal, to prevent others from accepting wages or working conditions which they for any reason find inadequate or intolerable. Any attempt to interfere with the free movement of interstate commerce by the use of physical force or violence against individuals or the instrumentalities of interstate commerce is open violation of existing law.

"Any violence offered persons, on account of their attempt to operate a mine or any other legitimate business, is in flagrant violation of the laws of every State in the Union, is a breach of the peace and generally constitutes a more serious offense.

"What we need is an honest, capable, fearless execution of the laws now on the statute books. If old laws are not executed, new ones probably will share the same fate.

"A President with a Bessemer steel backbone would be worth a volume of violated laws."

Senator New, Indiana, states:

"I favor any legislation dealing with the industrial situation that will give to the executive every power that can be permitted under the Constitution to preserve peace and order and see that the public is provided with the things essential to life and happiness. Coal and transportation are essential."

Asked if he thought the President had sufficient power to handle the industrial situation, Mr. New said: "That is more for the lawyers to determine than myself."

An inquiry as to whether he would favor anti-strike legislation brought the reply: "I do not favor laws denying men the right to quit work individually or collectively. When a man quits work he quits. He has no right to interfere with another man who wants to work."

While many Congressmen consider it their duty to find a way to stop great strikes, and the consequent suffering of the public, they are able to offer only desultory plans aiming at separate phases of the question. Bills embodying these plans are buried in committees or the calendar. One of the recent measures, for example, proposed that the railroad wage question be left with the Interstate Commerce Commission.

A careful consideration of the replies to the canvass indicates that members of Congress are taking refuge in the fact that President Harding in his recent message laid out no very specific plan to meet the general problem. Another reason for inaction is that executive handling of the present emergency makes it indelicate for Congress to go ahead of the White House.

Still another reason is that State powers are far greater than those of the Federal Government to deal with situations like the present one. The invasion of State rights, which comprehensive Federal legislation might entail, also is one of the many difficulties to be overcome. Congress appears to be doubtful as to whether the industrial question is its business.

Senator Hitchcock, Nebraska, was the only Congressman to venture upon new ground. He offered for discussion the suggestion of a law intended to prevent transportation strikes and lockouts by a contract between the managers and workers. Such a contract would make it unlawful for the roads to employ men who would not sign agreements on accepting employment, would settle difficulties by means other than striking, and would also make it unlawful for the roads to violate their part of the contract without similar resort. Both sides, if unable to agree, would have the right of appeal to a higher conference or board, where, if a decision were unsatisfactory to either side, an appeal could be taken still higher. Mr. Hitchcock believes the form of this machinery could be left for further discussion, but he is of the opinion that such a plan, if found to be feasible otherwise, would be constitutional. He hopes that an agreement may be devised to overcome the hostility of labor boards on arbitration so that a structure for peaceful settlement of differences may be had.

NOW

Not at the End of the Fiscal Year

Big business, operating on close margins, has found it unsafe to wait until the end of the fiscal year to take inventory, determine profit and loss, and complete the balance sheet.

Big business has proved, both for itself and smaller business, the absolute necessity of *knowing*, exactly, NOW, daily, or at least once a month, the extent of profits and progress.

The current trend of sales and production, used as an indication of what to expect at the end of the fiscal year, is, "generally speaking," "fairly accurate." But "generally speaking" is not accurate enough.

The only safe and constant basis for executive decisions is *exact knowledge,* facts and figures, *accurately maintained.* "NOW, not at the end of the fiscal year" means the prompt correction of mistakes, elimination of loss, *insurance* of profits.

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The INDUSTRIAL CALENDAR

Secretaries of Associations are invited to send us the dates of their conventions as early as possible so that their conventions may be properly listed below. When especially requested by Association Secretaries, we will send dates and other available notices concerning meetings of other associations.

October. *California Automobile Trade Association,* Santa Barbara, Cal.

October. *National Machine Tool Builders' Association,* New York City. (E. F. Du Brul, Secretary, 817 Provident Bank Bldg., Cincinnati, O.)

Oct. 2-3. *New England Bakers' Association,* Swampscott, Mass.

Oct. 2-4. *Grain Dealers National Association,* New Orleans, La.

Oct. 2-4. *Executive Board of Associated General Contractors,* Detroit, Mich.

Oct. 2-6. *American Society for Municipal Improvements,* Cleveland, O. (Charles Carroll Brown, Secretary, St. Petersburg, Fla.)

Oct. 2-6. *American Bankers' Association,* Hotel Commodore, New York. (W. G. Fitzwilson, Secretary, 5 Nassau Street, New York City.)

Oct. 2-7. *American Society for Steel Treating,* General Motors Building, Detroit, Mich. (W. H. Eisenman, Secretary, 4600 Prospect Avenue, Cleveland, Ohio.)

Oct. 2-7. *Fire Prevention Exposition,* office 405 Lexington Avenue, New York City. (A. E. MacKinnon, Director of Exhibits.)

Oct. 4-5. *National Association of Cotton Manufacturers,* Hotel Traymore, Atlantic City, N. J.

Oct. 4-5. *Canadian Bread and Cake Manufacturers Association,* Toronto, Ontario.

Oct. 4-9. *American Society of Civil Engineers,* San Francisco, Cal.

Oct. 7-11. *Investment Bankers Association of America,* Del Monte, Cal.

Oct. 7-14. *Second National Aero Congress and National Airplane Races,* Detroit, Mich.

Oct. 7-14. *Annual Electric Progress Show,* Grand Central Palace, New York City. (N. Maul, Secretary, 130 East 15th Street, New York.)

Oct. 9. *Bricklayers, Masons and Plasterers International Union of America,* Springfield, Mass.

Oct. 9-11. *National Council of Traveling Salesmen's Associations,* Cincinnati, O.

Oct. 9-11. *American Gear Manufacturers Association,* Chicago, Ill. (F. D. Hamlin, Secretary, 4401 Germantown Ave., Philadelphia, Pa.)

Oct. 9-13. *American Society for Municipal Improvements,* Cleveland, O.

Oct. 9-14. *National Association Electrical Contractors and Dealers National Convention,* Cincinnati, O. (Farquson Johnson, Secretary, 15 West 37th Street, New York City.)

Oct. 9-14. *American Mining Congress,* Public Hall, Cleveland, O. (E. C. Porter, convention manager, Hollenden Hotel, Cleveland, O.)

Oct. 10-12. *South Central Gas Association,* Hot Springs, Ark. (S. J. Bollinger, Secretary-Treasurer, San Antonio, Tex.)

Oct. 11-13. *National Federation of Implement Dealers' Association,* Chicago, Ill. (H. J. Hodge, Secretary, Abilene, Kan.)

Oct. 11-13. *National Association of Electrical Contractors and Dealers,* Hotel Sinton, Cincinnati, O.

Oct. 11-14. *Association of Edison Electric Companies,* New York City. (Preston S. Millar, Secretary, 80th St. and West End Avenue, New York City.)

Oct. 16-18. *National Association of Ice Cream Manufacturers,* Hollenden Hotel, Cleveland, O.

Oct. 16-19. *American Public Health Association,* Cleveland, O.

Oct. 16-21. *"Management Week" of the American Society of Mechanical Engineers* (The Society of Industrial Engineers and The Taylor Society co-operating). (Calvin W. Rice, Secretary, 29 West 39th Street, New York City.)

Oct. 17-19. *American Railway Bridge and Building Association,* Cincinnati, O. (C. R. Lichty, Secretary, Chicago & North Western Ry., 219 North Waller Avenue, Chicago, Ill.)

Oct. 17-21. *Association of Ice Cream Supply Men,* New Cleveland Public Hall, Cleveland, O.

Oct. 18-19. *Southwestern Business Congress,* Tulsa, Okla.

Oct. 18-20. *Society of Industrial Engineers,* McAlpin Hotel, New York City. (George C. Dent, Business Manager, 327 S. La Salle Street, Chicago, Ill.)

Oct. 18-20. *National Association of Farm Equipment Manufacturers,* Chicago, Ill.

Oct. 19-25. *Southern Textile Exposition,* Textile Hall, Greenville, S. C.

Oct. 23-25. *National Association of Commercial Organization Secretaries,* Hotel Statler, Detroit, Mich.

Oct. 24-26. *Southern Logging Association,* Grunewald Hotel, New Orleans, La.

Oct. 24-27. *American Gas Association,* Atlantic City, N. J. (Oscar H. Fogg, Secretary-Manager, 130 East 15th Street, New York City.)

Oct. 25-26. *American Manufacturers Export Association,* Waldorf-Astoria, New York City. (Maurice B. Dean, Secretary.)

Oct. 25-27. *American Trade Association Executives,* The Inn, Buck Falls, Pa.

Oct. 25-28. *Pacific Coast Logging Congress,* Tacoma, Wash.

Oct. 26-27. *National Meeting of Society of Automotive Engineers,* Detroit, Mich.

Oct. 26-28. *National Conference for the Study of Highway Engineering and Highway Transport Education,* Washington, D. C.

Oct. 30-Nov. 3. *Association of Railway Electrical Engineers,* Hotel La Salle, Chicago, Ill.

Oct. 30-Nov. 11. *National Food Show,* 102d Engineers Armory, New York City.

Foreign Events

Oct. 1-15. ***General International,*** **Lyons.**

Oct. 4-15. ***Automobile Show,*** **Grand Palais, Paris, France.**

Oct. 12-23. ***International Commercial Vehicle Exhibition*** **at Olympia, London, England.**

November. *Annual Exhibition Automovil Club Argentino,* Buenos Aires, Argentina.

Nov. 10-Dec. 19. *Automobile Show,* Palais de la Cinquantenaire, Brussels, Belgium.

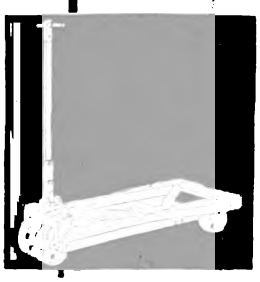


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has been used for years by engineers and mathematicians. Of late it has been called to aid the business man in showing vital facts in natural proportions. But the business man has found it hard to make engineering forms fit business conditions; hence, the development of EDEXCO DEVICES FOR GRAPHIC REPRODUCTION OF FACTS.

Edexco devices are scientifically correct because they have been developed by a university graduate in engineering. They are practical for business use because they are the result of his nine years' active experience in manufacturing, buying and selling.

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are simple types of control boards that make it easy for the executive to picture quotas and results in large or small businesses. A few minutes a day make all necessary changes.

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The INDUSTRIAL DIGEST

October 14

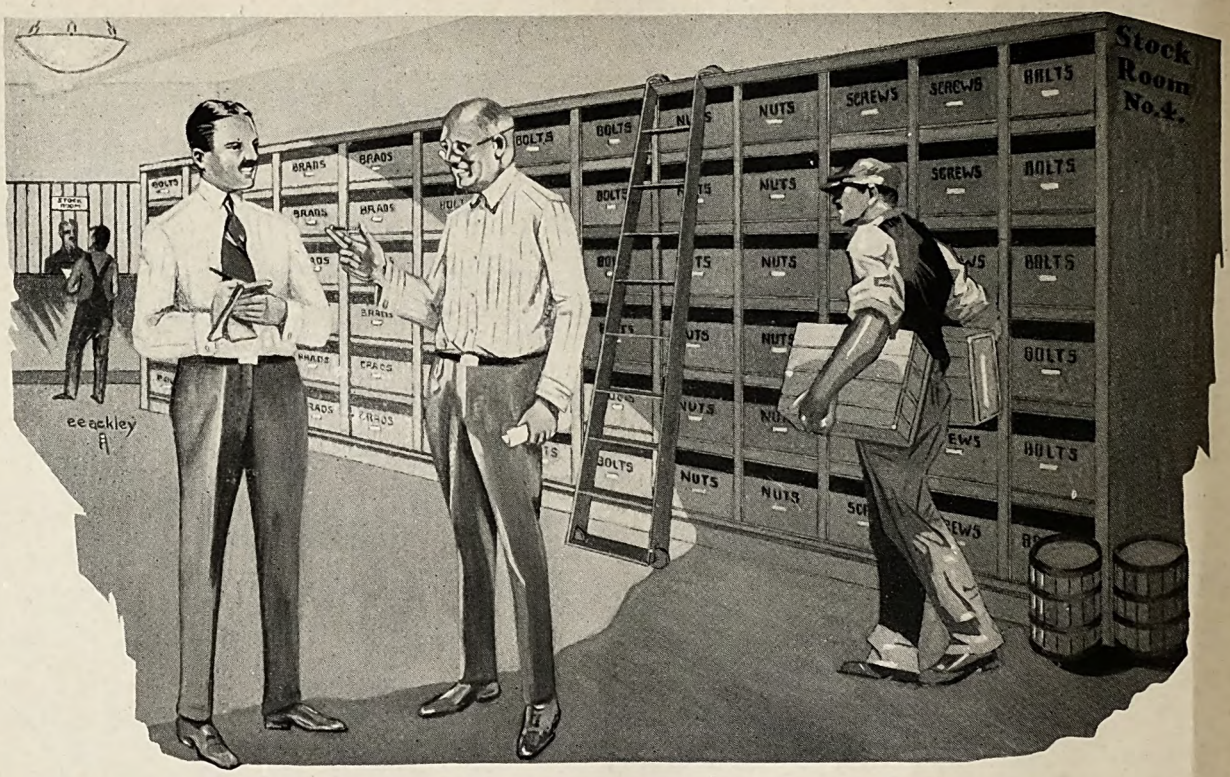
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OCT 19 19

When Oil and Water Mix!

See page 1676



"We have 1,243,612 of these bolts" —they told me

Auditing for this Company was an education. Their inventory shows almost to a nail how many of the millions of parts used in the manufacture of their 11,000 different articles are in stock.

IN all my experience I had never encountered a firm with such an enormous quantity and variety of items to handle. Yet they have the most perfect stock control I ever saw.

"We used to be swamped a dozen times a year," said the chief accountant, "until we installed Elliott-Fisher machines. From the first day of installation these machines overcame the difficulties and today we have perpetual inventories covering every phase of stock control.

"We have 15,000 stock record cards," he went on, "with 1,000 postings a day. These cards show at all times the quantity of stock on order, available, apportioned, and on hand. The eight columns on the cards correspond to the eight column registers on our Elliott-Fisher machines. The system controls give a perfect tie-up of totals and prove the work accurate as it is done. No other method we ever heard of permits this."

He showed me how the flat writing surface which distinguishes the Elliott-Fisher from all other machines enables them to use any size of form and make any desired number of clear, perfectly registered carbons. "That flat writing surface is the big feature," he said.

Here's what the Elliott-Fisher machine actually does:—

1. It gives a complete record (written description as well as figures) of each transaction. Without both no record is really complete or understandable.
2. It saves the maximum of time and labor by making the greatest number of records or the greatest number of legible copies of one record at one writing. The invoice, the bill of lading, the statement, the ledger record, the analysis of sales or purchases, or any other related combination of records, can be made at one operation on the Flat Writing Surface, an exclusive Elliott-Fisher feature.
3. It provides the Daily Audit Sheet, a carbon reproduction of the entries made on all records, which gives mechanical proof of the operator's accuracy.

In return for an hour of your time, the Elliott-Fisher representative will help you analyze your accounting problems and without placing you under any obligation make a written report of what Elliott-Fisher can do for you.

Elliott-Fisher

Accounting and Writing Machines:
Flat Writing Surface

ELLIOTT-FISHER COMPANY
Madison Ave. at 43d St., New York, N. Y.

Where would we be anyway if it weren't for advertising?

WHAT a lot of time advertising saves us! We need something. We see it advertised. And we go straight from where we are now to where the article is sold.

Have you ever gone around from place to place seeking for something which you knew existed but which nobody else seemed to know anything about, not even the storekeepers?

You have wasted an hour, maybe several hours, possibly half a day. You have worn out your patience, and before the end of the quest probably you began to figure that the thing which you sought was not, after all, so good as you thought it was, otherwise other people besides yourself would know something about it.

The manufacturer who advertises invests his money, therefore, not alone to tell of the merits of his goods but to save you time. The manufacturer who is willing to pay for advertising space in newspapers or magazines in order to point out to you where his merchandise is sold, so that you may get there quicker and buy it easier, is not going to skimp or cheat in manufacturing it.

After going to all the trouble and expense of telling you just where you may find it, he is going to see to it that when you do buy it, it is good enough so that you will buy it again.

And in making up your mind about merchandise which is advertised, consider this last thought—the manufacturer can well afford to make it as good as it can be made because one sale means hundreds, even thousands of others following naturally and costing him nothing extra.

[Published by THE INDUSTRIAL DIGEST in co-operation with The American Association of Advertising Agencies]



THE INDUSTRIAL DIGEST

A fortnightly digest of the informative articles in one thousand leading industrial magazines covering thirty industries

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Are you a member of the "*Can't Find-Time-to-Read*" Club?

"I SIMPLY can't find time to read the magazines and newspapers that I know I ought to read." These words were said to us not only by one leading business man, but by hundreds of leading business men. On their desks, in their offices—on the tables in the directors' rooms, on the bookcases at home, stand piles of trade and technical publications and newspapers containing a veritable gold mine of information. And yet, valuable and important as that information is, it has been impossible for thousands of business men to spend the time necessary to dig it out.

For the problem is not one of reading what is important—it is one of eliminating what is unimportant. Out of the thousands and tens of thousands of pages in the 600 trade and technical publications, and the 400 general magazines and newspapers which may contain valuable information, perhaps two or three hundred pages are all that you, for example, are interested in.

Now, the ideal way to get this information would be, first, to have a reading secretary at your right hand who would go over every one of these publications and select the information important for you, throwing aside all the waste matter.

But, of course, this secretary could only select the articles which would be of value to you. He would not be competent—no one man would be competent—to condense these articles for quick reading so that you might determine quickly which articles you desire to read at leisure. It would require a staff of experts—each an authority in his line—to do this for you.

And since the average business man can scarcely afford to pay for the reading secretary and the staff of experts which this would require—we feel that THE INDUSTRIAL DIGEST has accomplished a very real service for the American business man in doing exactly this thing.

That Is What the Industrial Digest Does for You

OUR editorial staff—knowing through years of experience just the sort of thing that will interest the production executive in industry—selects the material which is of value and interest to you. Our staff of industrial experts reads, analyzes, and condenses this information into a fortnightly report.

This report is constructed with a view to absolute simplicity and uniformity. That is to say, it is organized into different sections so that each reader may know every fortnight where to find the information which is most valuable to him. It is simplified because there is absolutely no extraneous matter. Everything that appears in this fortnightly report is worth reading—and everything in the report of interest to any executive can be read in two hours.

Furthermore, the report is so presented to you that in ten minutes you will be able to get a bird's-eye view of industrial conditions and an accurate record of the outstanding events in your own and allied lines of business.

It is convenient for reading on the train or on the street car. It is the right size to be folded and put in the coat pocket. That five minutes when you are waiting for your train or just before you go to the theatre—can be utilized to good advantage with THE INDUSTRIAL DIGEST.

When you go into a restaurant with an appetite for a large juicy beefsteak, you do not order a steer from the kitchen—you order a beefsteak and you get it.

Do we need to emphasize the comparison?

Vol. 1
No. 25

THE INDVSTRIAL DIGEST

Oct. 14
1922



The Business Weathervane

A Summary of Expert Opinion

The unsettled foreign situation does not present any immediate unfavorable factors which would warrant alteration in the policy of expansion which most manufacturers are now adopting. As the **Brookmire Economic Service** puts it, "whatever ultimately alarming possibilities there may be in the foreign situation, there is nothing at present of sufficient weight to alter the fundamental upward trend of business in the immediate future. Domestic developments warrant the belief that this upward trend of business is just well started, and that it will run over at least well into 1923. Credit conditions throughout the country as a whole continue to work a still more favorable position."

And the **Harvard Economic Service** points out that "the dominating factor at the moment is the threat of war in the Near East, which has probably contributed to the tightening of money, as it has undoubtedly contributed to the decline of security prices since the middle of September. The gravity of the situation should neither be minimized nor exaggerated. We have difficulty in believing that the dissensions among the Allied Powers, which are fundamentally responsible for the present impasse, are likely to be carried to a point that will result in the starting of a war the end of which no man can foresee."

This conclusion is borne out by the statement in **Bradstreet's** "that reports from leading industries are of expansion in most directions, notably in pig iron production, which is now back at the level of July as regards active furnaces; and in building, advance reports for September showing a value of house, office and store construction planned for September in advance of that for August."

J. H. Tregoe, executive manager of the **National Association of Credit Men,** summarizes the favorable factors in the present situation as follows:

1. Increased volume of business. This increase is reflected by carloadings, bank clearings, and other indices of business volume.
2. Adjustment of the coal strike and the collapse of the shopmen's strike. We put these in the favorable column merely because of their immediate effect, and not because they betoken a permanent settlement of the questions involved. They might just as well be placed in the unfavorable column of this summary.
3. Large increases in the production of basic commodities, apparent in iron, steel, and other commodities of basic importance.
4. Increased production in some of our larger industries. This is discernible in quite a few industries.
5. Increase in orders for railroad equipment.
6. The President's veto of the bonus bill. This action removes what might have been a serious burden to our recovery.
7. Improved condition of credit. This improvement is very noticeable in the reserves of banks and the credit available for sound enterprises and aside from speculative purposes.



The crop movement. (Omaha Bee)

The unfavorable factors, in Mr. Tregoe's view are:

1. Disparities still existing in the relation of prices to one another, particularly the disparity existing between prices of farm products and manufactured products.
2. Low prices of farm products. This situation is limiting the buying power of the farmer, although this condition is improved over a year ago.
3. Advance in prices of production costs. Undoubtedly, and as we have pointed out many times, advances in fabricated commodities, and particularly where they are based on higher production costs, will unfavorably affect our recuperation. The price must be steadfastly watched.
4. High prices of fuel and lighting. In August, fuel and lighting stood at 271, as against 155 for the general index. This is serious as affecting home and industrial necessities.
5. Continuing unsettled situation in Europe and Near East.



The Fortnight

The Bankers Consider Europe

THE outstanding event of the past two weeks was the convention in New York of 10,000 members of the American Bankers Association. Thomas W. Lamont, Reginald McKenna and others of financial prominence here and abroad, directed their remarks upon the question of the economic recovery of Europe.

The sentiment at the convention definitely favored reconsideration of our foreign debt problem. Several of the leading speakers hinted broadly at a cancellation of debts, and although Mr. McKenna intimated that Great Britain is willing and able to pay her debt to us, none of the other European countries is now—or will be within the immediate future—capable of paying its bills.

Now, when a business man gets so deeply involved that he cannot meet his obligations, either he goes into bankruptcy or his creditors get together and make an arrangement whereby he can continue in order to wipe out the debts. Certainly, no one has any desire to see Europe or any of its nations bankrupt. The matter, therefore, resolves itself into a question of an international economic conference to decide on a workable financial solution. Such a conference will consider the problem of cancellation or repudiation, the question of German reparations, and, perhaps, most important of all, the balancing of Europe's budgets.

Our Administration is feverishly anxious that no suggestion of cancellation be put before the country in an official was prior to elections. Senator Lodge's recent speech in Massachusetts would indicate that there is no possibility of Washington adopting a program favoring cancellation. The Administration favors postponement — most bankers favor a scaling down of debts.

The leading speeches before the Bankers' convention regarding the European situation will be found in this issue.

Near East Cloud Blows Over

THE threatening situation in the Near East has cooled down considerably. Observers in a position to know feel justified in assuring business men that there is nothing to fear from that quarter in the immediate future. But whatever the outcome may be regarding the freedom of the Dardanelles and the possession of Thrace, the underlying factor in the situation should be kept in mind, *i. e.*, the commercial antagonism existing between France and England.



(Birmingham Age-Herald)

A stimulant—and the morning after.

When Will Germany Collapse?

MANY alarming reports regarding Germany have been received in this country during the last few weeks. They take the form of predictions that the existing government may not last until Christmas, that unemployment will be so widespread shortly that a revolution is imminent, that Germany as a nation is to-day virtually bankrupt, etc.

Certain facts in the German situation are apparent. The mark has declined in value steadily owing to the necessity for meeting the government deficit.

The mark has gone so low that it is becoming daily more difficult and it may shortly become impossible for Germany to finance purchases of raw materials abroad. If it is not possible for Germany to pay for purchases abroad, she will be forced to close her factories. And if German factories are to close and there is to be general unemployment there, to quote Jules S. Bache, "the day that any large percentage of German laborers are unemployed—and the day that will announce the exhaustion of the foreign raw materials now on hand—on that day the ruination of Germany will become apparent even to those who now ignore the accumulative constructive condition of the forced depression of the value of the mark—the only asset in which Germany was allowed an unrestricted export market, and therefore the only asset on which they could raise gold." In this issue will be found an article covering the amazing sale of marks to investors in this country and the certain consequences of these sales.

Prices Are Out of Balance

AN unusual condition has arisen in the short upswing of the business cycle on which we are now engaged. Labor costs have advanced faster than prices of raw materials. And, in consequence, prices of certain raw materials have lagged far behind the prices of finished commodities. This differential will be ironed out without difficulty in the case of manufacturers, but in the case of farm products it will not be adjusted so easily. The price of farm products is now relatively much lower than prices of manufactured commodities. Farmers are again beginning to protest against unfair discrimination in this respect and this protest will assuredly have its influ-

in Perspective

ence on the farmers' purchases during the fall and winter.

Steel Industry Prospers

THE unfilled tonnage of the United States Steel Corporation on September 30 amounted to 6,691,607 tons—an increase of 741,502 tons over the August 31 total. This is the greatest monthly gain since January, 1920, and, if fundamental factors mean anything, it is a favorable indication. The American Steel Foundries Company has larger unfilled orders than ever before except during the two war years when the plants were doing special work. Virtually every iron and steel company in the country will be working during the next six months as close to capacity as the limited supply of labor will permit. The enormous orders placed by railroads for new equipment, the astonishing prosperity of the automotive industry and the continuance of the building boom are directly responsible for this favorable condition in our most important industry.

Business Will Be Good in 1923

TWO of the basic indexes of business have shown marked improvement recently. One of these is the record of failures. The other is the continued activity in building.

In 1919, when nearly everybody was making money, the average number of failures had dropped as low as 500 a month and the liabilities to less than $10,000,000. This was less than the monthly average of nearly 1,400 failures and $28,000,000 liabilities in the five years prior to 1914. During 1920 and 1921, of course, failures jumped enormously. The best proof that the country is getting back on its feet lies in the statement for September, showing a drop in the number of business fatalities to 1,469, or to little more than half the total of 2,725 in January of this year. The decrease in the liabilities during September amounted to little more than $30,000,000. This is the best showing in this regard that has been made since the summer of 1920, and gives reasonable evidence for belief that the depression period has completely passed.

Contributing as well to the optimism of most observers is the impressive gain in the volume of construction. Keeping in mind the fact that labor has been severely handicapped by strikes and at present is hampered by a labor shortage and high operating costs, the fact that September's total of $271,000,000 (for the 27 Northeastern States) is 11% greater than the total for the same month last year is perhaps the best evidence we have that business will be good all through next year.



(Louisville Courier-Journal)

The goose that lays the golden eggs.



(New York Tribune Syndicate)

Never leave a broken-down bridge behind you.

Should We Cancel Our War Debt?

Ten thousand bankers in convention discuss the all-important question of Europe's economic recovery

WHEN 10,000 American bankers get together, what do you suppose is their chief topic of discussion? Interest rates? The condition of American business? The working of the Federal Reserve system?

The American Bankers' Association held its annual convention in New York during the past fortnight, and the important addresses were all concerned with one big subject. It was not one of the three subjects suggested above. It was a subject which most American business men would dismiss as uninteresting and, to us, unimportant—the economic condition of Europe.

The average convention of American business men would consider Europe a distant subject, suitable for academic discussion only. But the bankers were really interested. They seemed to think that Europe matters a great deal to the United States now, and that unless Europe straightens itself out we won't be as prosperous as we ought to be. They seemed to believe that American leaders of industry should learn as much as they can about the state of Europe, and that America can do everything possible to help those on the other side who are struggling to regain their feet.

Thomas B. McAdams, president of the Association, told the convention that "permanent prosperity can come to the United States if this country uses her resources in brain and money to help bring about a practical solution of the chaotic situation now threatening to destroy the economic life of Europe."

Isolation and selfishness are not qualities of the true American, asserted Mr. McAdams, and then added: "I do not believe there is anything in the history or ideals of our people which can justify our failure to help in a situation where our counsel and assistance are so essential to the restoration of world order."

Mr. McAdams summed up existing conditions in the world, four years after the Armistice, "while we stand idly by, neither offering assistance nor making a suggestion." England, he said, despite the suspicion cast upon her motives, must be regarded as a stabilizing influence "in protecting the wrecks of European statehood from further demoralization." France cannot be blamed entirely for refusing "to assent to Germany's reconstructing her world trade at the expense of French industry," declared Mr. McAdams, "but, even so, the allied nations, if they would maintain the civilization for which they fought, must throw aside unnecessary prejudices and reach an agreement as to modifying reparation payments which will fairly care for the needs of France and at the same time not utterly demoralize the industrial life of Germany.

"Has not the time arrived for the United States to cast aside her policy of aloofness and throw herself whole-heartedly into the situation, that a cure for social disorder and financial demoralization may be speedily devised? We may picture for ourselves all the prosperity which is in our grasp today, so far as our international situation is concerned, but we must realize there can be no permanence in it unless a sound foundation can be laid upon which the structure of future international commercial relations may be safely built."

Considering the case merely from the selfish point of view, said Mr. McAdams—the need for world markets for excess products of our farms and factories—"there must come a realization of the need for our becoming aggressively active, rather than passively submissive. Transcending merely selfish motives, there comes the distinct call for us to use our abundant resources, the strength of our isolation, and our inherent ability to lead and inspire.

"It may be that Europe is not yet ready to have us participate or to accept conditions which necessarily must be laid down as a basis for our co-operation, but, even so, this does not relieve us of the obligation to offer to assist and so soon as possible to outline, as we see them, the essentials to an ultimate solution of the situation."

These essentials, in the opinion of Mr. McAdams, must be the further reduction of armaments, the balancing of the French budget, realization by France of the unlikelihood of new German military aggression, and the preparation by all countries for a readjustment of reparations and interallied debt "upon a basis which fully recognizes the rights of the creditor and which will relieve the immediate burden of the debtor countries.

"England in discussing her indebtedness," said Mr. McAdams, "should not overlook the some 400,000 square miles of new territory she gained through the war, and it must be remembered that America settled upon a basis of receiving nothing except the ultimate repayment of moneys advanced.

"Complicated as the situation appears, it should be possible, through making a fair analysis of assets and liabilities, to prepare a readjusted balance sheet which will prove acceptable and furnish a proper starting-point for the reawakening of international trade.

"Though often deliberate in action, we have never failed to respond and render the maximum of service when once convinced of our duty. Such an opportunity is the present emergency. The determination of our international policy, whatever it may be, should be based upon the broadest possible conception of service and should not be restricted or hampered by party platform or political expediency."

Europe's debt to us, naturally, was one of the subjects to which the speakers at the convention devoted much time. John McHugh, president of the Mechanics and Metals National Bank, New York, said that in his opinion the time has come for determining a definite policy regarding the debts of the Allies to the Treasury of the United States, which now amount to about $11,700,000,000.

"By dealing in a large-visioned and liberal manner with the debts due us," said Mr. McHugh, "and exercising our credit

The Sums Owing to America

WHEN it comes to this question of interallied indebtedness, suppose we put to ourselves, in all seriousness, that point that the French have put to us, namely—"Is it fair for us, inasmuch as we seem to be urging France to forgive part of the German debt in order to effect economic adjustments in Europe, to do a little forgiving ourselves?" As we put this point to ourselves, suppose we spend a moment in looking at the amounts of governmental indebtedness owing to our Government. Just for record, I will mention again the rough totals by countries:

Armenia	$ 11,959,917
Austria	24,055,708
Belgium	377,564,298
Cuba	8,147,000
Czecho-Slovakia	91,169,834
Esthonia	13,999,145
Finland	8,281,926
France	3,358,104,093
Great Britain	4,166,318,358
Greece	15,000,000
Hungary	1,685,836
Italy	1,648,034,050
Latvia	5,132,287
Liberia	26,000
Lithuania	4,981,628
Nicaragua	170,585
Poland	135,620,583
Roumania	36,128,494
Russia	192,601,297
Serbia	51,153,160
Total	$10,150,154,196

(From the address of Thomas W. Lamont before the A. B. A. Convention.)

power wisely, we can go a long way toward mitigating the circumstances which keep Europe in turmoil. If any portion of the debt be cancelled eventually, a direct benefit may result to us, even though, at first, it would seem as though American taxpayers were being penalized for the benefit of others. A partial cancellation would be a contribution to world stability on our part, if it served the purpose of compelling an adjustment of the difficulties which now serve as a curse on Europe. Such a part cancellation readily could be made contingent upon agreements as to the balancing of budgets, the curtailment of inflation, and the elimination of governmental waste."

In this connection, Mr. McHugh suggested, the extension of new loans to those very interests who might be relieved from existing obligations might be considered. Such a step might be well worth while, he thought, to promote the sale abroad of a great volume of commodities and finished products made in this country in greater quantity than can be utilized by the people of the United States.

"Whether we will go on with overproduction in the future," he continued, "depends on whether foreign markets absorb our surplus, and that, in turn, in large measure on whether we can and will adequately finance our foreign trade.

"This," said Mr. McHugh, "will continue to be one of our national problems for some time to come. But do not misunderstand me in this: It is not my purpose to maintain that the United States shall henceforth indefinitely turn over every year a great surplus of goods to consumers abroad, piling up endless credit balances until they grow so large as to destroy all hope of their settlement. Europe, indeed, needs gold, goods and credit, and we are in a position to furnish them. The increase in our investments in foreign securities would enable foreigners forthwith to increase their buying power, and in the degree would enlarge our exports."

The practice of shipping goods abroad on credit, which this would permit, has already been responsible, to a large extent, according to Mr. McHugh, for the present economic maladjustment between Europe and the United States. The true solution would lie in an increase of the productivity of Europe, so that commerce between the two sides of the Atlantic might be carried forward practically on the basis of an exchange of goods. This would result in the importation of goods which the United States does not produce cheaply, to balance those articles produced in this country in abundance.

"Where credits are from now on granted to finance a surplus of exports over imports," observed Mr. McHugh, "they should be granted with the utmost care, with a full appreciation of their proper relation to the primary principle of foreign trade, and with a definite understanding regarding their payment.

"In considering all these things we must look forward to the time when Europe recovers its place in trade, and we must prepare ourselves for the inevitable adjustments which are to occur. We shall not always be coincidentally the world's greatest creditor and export nation on balances. Nor, I take it, would any of us want to be."

Europe Needs Stabilizing

MR. McHUGH, reviewing the economic and financial situations here and abroad, declared that the fundamental remedy for the plight of Europe was stabilization. Those who had hitherto been ministering to her ills had done so on a political theory only, he held, and had ignored the economic factors. Hence, before gold begins to flow back to Europe, the speaker averred that a real basis for peace-time relations must be adjusted, debts due by one nation to another must be compromised, where necessary, and then funded, and long-term credits must be granted. He maintained that such problems as the fixing of the German reparations had a very significant interest here, not only because of the fundamental relations of it to international trade and finance, but because of the fact that Americans by purchasing $500,000,000 worth of foreign currencies, the bulk in German marks, had had an extensive part in the payment of the Teuton reparations.

"In brief," commented Mr. McHugh, "America has contributed handsomely, although unintentionally, to the payment of Germany's war penalty."

In view of the fact that we expect Germany in the future to buy heavily from the United States, the speaker added, this country has more than a passing interest in the terms that are fixed upon that country.

Regarding Europe in general, he said the part the United

(Turn to page 1725)



(Omaha Bee)

Uncle Sam seems particular about meeting some of Europe's acquaintances.

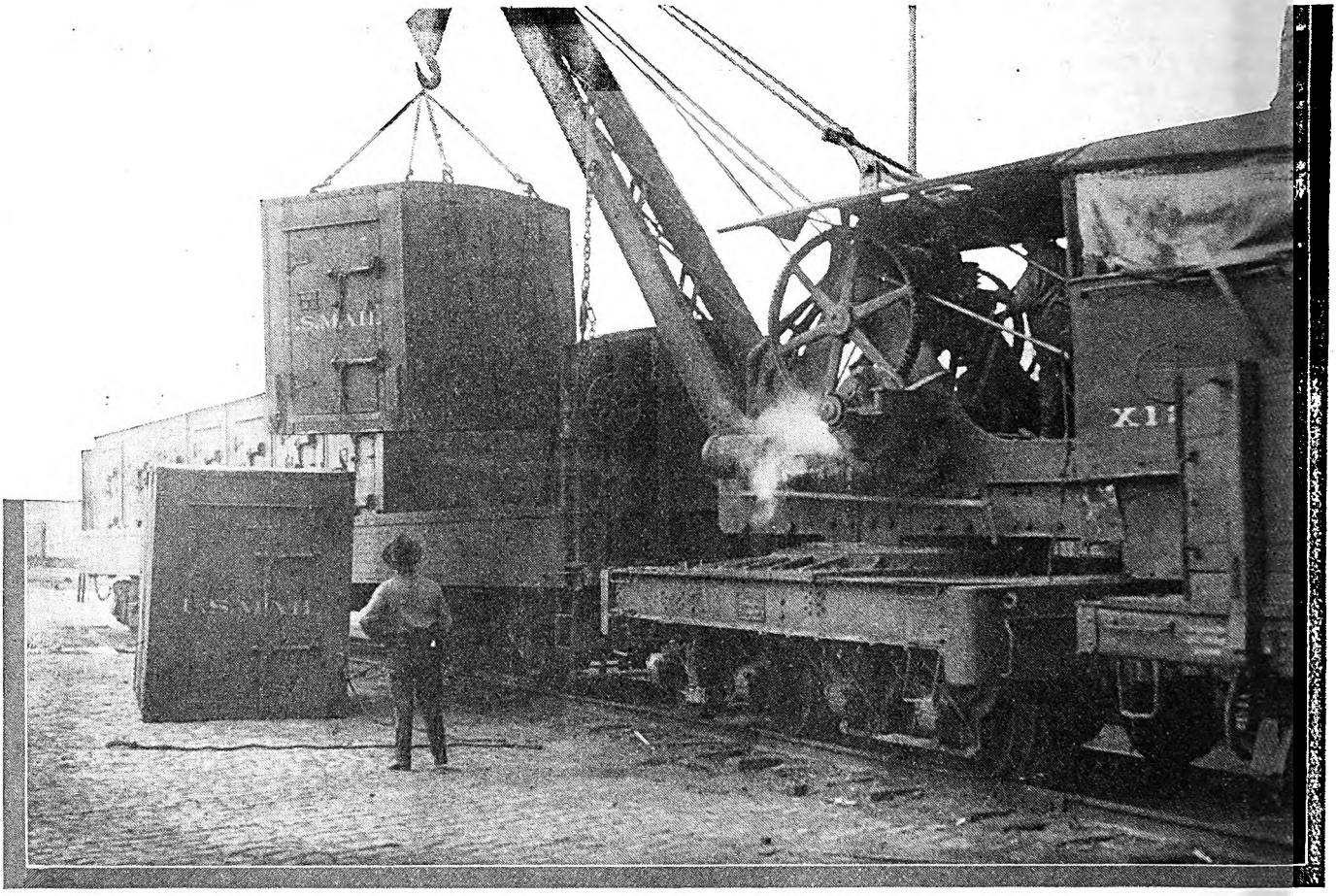


(Rochester Times-Union)

A barrier that may eventually prove to be a blessing, after all is said and done.

What Bankers Think of Business

A compendium of interviews with the country's leading financiers gathered in convention in New York City



Securities to be transported safely—in steel fire- and burglar-proof container cars.

GOOD business ahead, but no boom, sums up the way the bankers, who assembled in New York for the 48th annual convention of the American Bankers Association, express their views when asked for opinions of the outlook. Following are the statements of a number from various Federal Reserve cities in widely separated sections of the country:

Cleveland Federal Reserve District

J. A. HOUSE, president, Guardian Savings and Trust Company, Cleveland, Ohio, and president, Trust Company Division, A.B.A.:

"I feel very much assured as to the prospects of business during the coming year with certain reservations. The settlement of the coal strike and the progress in settlement of the railroad strike creates stability upon which it is now possible to predict a business situation which, until those settlements, was impossible. Opinions may vary as to the merit or demerit of certain provisions of these settlements, but the fact remains that there has been an adjustment.

"Undoubtedly, there is further liquidation to take place, especially with reference to labor costs and material prices. I believe, however, that the demand of the country for the next year is such that these adjustments will have to be deferred. We have probably passed through our first flat spot in business following the war and will experience an active market at substantially present prices for possibly two years.

"In Cleveland employment is practically 100%, that is to say, that anybody seeking labor can find it. There is ample money available in local financial institutions to meet normal needs. Building is at a high point and will probably so continue for a good part of the ensuing year.

"Depending as it does on the four fundamental elements, rail transportation, water transportation, iron and coal, business in the Cleveland district will undoubtedly remain as substantial as in any community in the United States."

Another Cleveland Estimate

FRED H. GOFF, president, Cleveland Trust Company, Cleveland, Ohio:

"In the Cleveland district, as in the rest of the country, every kind of industry and almost every branch of trade, is in better condition in the fall of 1922 than it was in the autumn of 1921. During the past year a great business recovery has been under way, characterized by steadily declining interest rates, an unprecedented building boom, record-breaking activity in the automobile industry, and steady expansion in most lines of manufacturing.

"During the past 12 months involuntary unemployment has largely disappeared, and most mercantile and industrial concerns are again operating at a profit. The vigor of this recovery has been so considerable and so sustained that business improvement has gone steadily forward despite the handi-

cap of the rail and coal strikes, and of the succession of gravely threatening situations in Europe. It is now feeling a new stimulus in the prospects for exceptionally good harvests."

President McAdams' Opinion

THOMAS B. McADAMS, vice-president, Merchants National Bank, Richmond, Va., and president, the A.B.A.:

"America is blessed with a bountiful harvest," said Mr. McAdams. "New wealth and an immense food supply have been produced. Fundamentally, we are in a sound financial position and can look forward to increasing prosperity in commerce and industry, provided carelessness and selfishness are not allowed to undermine the stability of our citizenship.

"Two outstanding problems perplex us—industrial controversy and unrest at home; and international financial difficulties abroad. In the solution of these questions the banker has a distinct community position and obligation as counsellor and adviser to the millions of people who have confidence in his judgment, integrity and patriotism."

The South Feels Encouraged

OLIVER J. SANDS, president, American National Bank, Richmond, Va., and chairman, special committee on taxation, A.B.A.:

"General business conditions in the Fifth Federal Reserve District are encouraging. The agricultural classes are our largest consumers, and this year the yield from crops will be much better than for the past two years. This means liquidation of frozen credits and increased business.

"Much new building has been projected but the increased cost of material, labor, fuel, etc., bids fair to prevent anything like a boom.

"The improved demand for lumber and our other products will bring much needed relief to a section which has suffered keenly from depression for the past two years. Cotton mills are fairly prosperous with outlook good. There is a general feeling of confidence, and were it not for the heavy tax burdens, which destroy incentive, this section could look forward to much new development in the immediate future."

Chicago District

M. A. TRAYLOR, president, First Trust and Savings Bank, Chicago, and chairman, Economic Policy Commission, A.B.A.:

"Business conditions have improved very much over last year. This has been true in spite of the strikes which have proved a check upon an immediate return of greater prosperity. Nevertheless, much has been accomplished. Liquidation has taken place in nearly all industries, and a recent table, issued by the Bureau of Labor, shows that the average of prices, which at one time had more than doubled since 1913, now is only 50% higher than the pre-war level. This is also borne out by the statistics of the Federal Reserve banks, which show everywhere a marked decline of borrowings on the part of member banks. Money on the whole is easy, though there is no super-abundance and not likely to be any if business resumes its normal course."

St. Louis District

F. O. WATTS, president, First National Bank, St. Louis, Mo., and former president, the A.B.A.:

"Fundamental business and banking conditions in most respects afford a substantial basis for believing that the United States can look forward to a period of good business. While nothing approximating a 'boom' is promised, yet the liquidation has proceeded so satisfactorily and the credit position of our banks is so strong that even the railway and coal strikes, wasteful as they were, become a minor influence.

"The annual crop yield is large and while prices of some of the farm products are relatively and absolutely low as compared with other prices, yet there is a marked improvement over last year and the farmer will have a great increase in his purchasing power for the coming autumn and winter.

"The loaning or credit facilities of the financial institutions are very large and legitimate demands for capital will be supplied with funds at a moderate rate of interest, at least, for some time. Ultimately we must, if Europe is to recover economically and restore the gold standard, expect to lose a part of our unduly large gold supply and, likewise, ultimately the postponed demand for capital, not only from abroad, but from many of our own industrial corporations, will assert itself. Both these factors will tend, in time, to increase the interest rate."

Kansas City District

E. F. SWINNEY, president, First National Bank, Kansas City, Mo., and former president, A.B.A.:

"We believe that much progress has been made during the four years since the signing of the Armistice and that we are much better off than a year or two ago, but we do not look for real prosperity in this district until our farmers are able to buy more of the things they need with the proceeds of grain and cattle produced, or become accustomed to getting along with less."

Texas District

J. W. HOOPES, vice-president, Central State Bank, Dallas:

"The business situation, so far as attaches to the trade territory of Dallas, is, in our opinion, very much improved. The general feeling of better nature prevails; merchants are buying carefully, but in considerably increased amounts.

"This territory comprises a very large portion of the cotton producing area of Texas, and while the crops are, in general, spotted, the prevailing prices have been very satisfactory, enabling the merchants and interior banks to liquidate freely.

"Building operations, according to advice from the lumber and building material interests, are increasing rapidly, and the general belief is that with a positive assurance that no lower cost will prevail in the near future, the builders are ready to go ahead. This statement is more or less reflected in the increase of clearance at Dallas and allied cities."

Southern District

ROBERT F. MADDOX, president, Atlanta National Bank, Atlanta, and former president, A.B.A.:

"The South is rapidly recovering from the recent depression. While the cotton crop is not much larger than last year, owing to the low cost of its production and the increase in price, the South's paying and buying power has been much improved.

"The boll-weevil will not be regarded as great a menace in the future, as it has been thoroughly demonstrated that by the intelligent application of calcium arsenate and the use of more fertilizer, cotton, even under boll-weevil conditions, can be successfully and profitably grown.

"The South has also learned the importance of diversifying her crops, and through raising more live stock and developing the dairying business will soon recover losses.

"The improved financial condition cannot be better illustrated than by showing the remarkable reduction in loans the member banks have made to the Sixth Federal Reserve Bank. Less than two years ago these loans amounted to $182,000,000. They are now about $30,000,000, showing that the member banks have paid the Reserve Bank more than $150,000,000.

"Many small banks, which were closed when the depression came, have reopened and the others are steadily working their way out. Labor is well employed, wholesale and retail trade satisfactory, building operations on a large scale, collections are good, money is in ample supply at reasonable rates for all worthy enterprises."

Marks—and Easy Marks

The *New York World's* exposé of "the greatest speculative folly in the history of the world"

WILL the German mark ever come back? Some 10,000,000 Americans who have bought marks in the hope that they will rise in value would be grateful for an authoritative answer to this question. These "investors" have watched the mark steadily drop in value, until today a thousand are worth only about 70 cents.

Americans, it is estimated, have lost a total of $904,000,000 because of the decline of the mark. The New York *World*, in a series of articles on what it calls "the greatest speculative folly in the history of the world," tells how these tremendous losses were incurred. It says:

"America has 'invested' the colossal sum of $960,000,000 since the war in German paper money, now almost worthless. America paid 10 cents, 5 cents, 1 cent a mark. America bought 80,000,000,000 paper marks at an average of 1 1-5 cents a mark, $12 a thousand. Today paper marks sell below 70 cents a thousand. America has left what may be worth $56,000,000. Not more.

"The victims in America of this stupendous folly, the most gigantic financial delusion in history, have lost $904,000,000. About one-third of the loss is represented by worthless stocks and bonds bought in Germany with marks. The buyers have given to Germany more than twice as much gold as Germany has paid in gold in war reparation payments to date, $365,637,000.

London reports British losses in German marks speculation at about $672,000,000.

"America has paid to Germany a sum equal to one-third the total of the American Civil War debt, $2,845,907,626, August 1, 1865. America, victor over Germany, has paid her as much as Germany in victory collected from defeated France as indemnity after the Franco-Prussian War of 1871—$968,000,000.

"The *World's* estimates are based on Berlin official statistics of September 9, 1922, and latest records of German marks distributers in this country.

"All the German paper marks in the world are worth today, at the current price, 70 cents a thousand, about $175,000,000 in American money, less than one-fifth of the vast sum America paid for one-third of them.

"New York City alone has lost, sunk without trace of recovery, $22,600,000 of the $24,000,000 she paid for German paper marks. The Bronx bought probably a half billion marks, one-fourth of the 2,000,000,000 credited to absorption by this city and its environs.

"Ten million buyers of paper marks in America is the *World's* estimate. Four out of five of them speak the German language as an inheritance of birth, parentage or the ancestral or local influences of childhood.

"This total of investors, about 10,000,000, means that ten out of every 115 men, women and children in the United States own or have held in trust for them an average of German paper marks which cost $100 at $12 per thousand in 1919-1921. The *World's* figures, based on actual records of sales of the paper marks imported in currency for New York City from 1919 to 1922, show an average price of $0.012 per mark paid for them. That $100 is worth only $5.80 today.

"Buying in America began with those who speak German and they remained the bulk of the market. The millions of American dollars they poured into paper marks purchasing as soon as the Versailles Peace Treaty was signed in midsummer, 1919, attracted the notice first, and soon aroused the cupidity, of non-Germanic observers. The bankers, brokers, foreign-exchange dealers here and throughout the country agree that German-speaking buyers took 80% of the German paper marks bought for America.

"Easy money! The lure of speculation made successful business men in America get German paper marks quick, paying big premiums, fearing they would be too late for the great garnering of dream profits. Right after the signing of the Versailles Peace Treaty in July, 1919, they paid for German paper marks as high as half their par price, 24 cents, which the paper mark commanded before the war. They paid more than paper marks were selling for in Germany's neighbor countries. This easy money mirage made millions of Americans, men of large salaries, take their savings out of the banks and buy Germany's paper promises. It emptied the little iron safes in 100,000 cupboards. It sent millions of dollars in Liberty bonds to market here to get money to invest in Germany's paper marks. And it still is taking its toll—in pennies today where it was $10 bills yesterday.

"Germany sold her paper money not at home to the loyal and those familiar with that financial medium. She sold it abroad. She sold it where it never had been seen before except in the hands of tourists—in America. She sold it so fast that the outside world took all she printed during one period of months, February to July, 1921. At the same time the mad millions of foreign buyers pulled out of Germany billions of marks which had circulated there. This was because the Government printing presses could not supply the demand abroad, from America and elsewhere.

Great Trap for Greed

"ONLY a few bankers bought them.

"A star of the screen bought a million paper marks in New York early in the market and paid a high price for them. He has them still.

"A Germanic-American banker in a Western city holds 35,000,000 paper-mark currency banknotes, his own. Every big gambler in foreign exchange has tried everything short of safeblowing and a stick-up in fruitless efforts to borrow them for speculation purposes. They have not stirred from the bank vaults. The big buyers were the first to buy, paid the top prices and are holding on the most tightly."

There was a time, after the war, when certain German securities sold at a premium in New York. The *World* tells as follows the story of the fluctuations in America of prices of German bonds and currency:

"The paper mark was returned to this market about July 15, 1919, and offered at $0.0856, the rate of exchange agreed upon a few weeks previously in Berlin by the financial representatives of the American Relief, the German Finance Minister and of the Reichsbank, the bank of note issue, which prints the marks. The price ran down to 5 cents in August, 1 cent about the first of 1920, started up in February and rose from $0.01 per mark to $0.0315.

"German bonds were being welcomed into the New York market at the same time. Municipal bonds of Hamburg, of Berlin and the German Government bonds were the leading issues, the media of heavy investment here. German municipal bonds paying 4% sold at a premium of 25 to 50%.

Bonds Follow the Mark

"GERMAN municipal bonds have declined in value in the same ratio as the depreciation of the German paper mark. This is so dependable as a basis for estimating their present value, the foreign bond department chief of a local house says, that he trusts to it in making instant bids



We thought the slump in marks we've seen
Was filling Fritz with sadness,
But now we half suspect there's been
Some method in his madness.

(John Bull, London)

Oh, what a madness!

on offers by telephone of bonds of smaller German cities, bonds unfamiliar to his books. He handles as large a business in German bonds as any man in America.

"And he says that most German stocks are of the sort bought on the boom time of the paper mark are gone below bidding for. Twenty-five billion paper marks bought in America for $300,000,000 were turned into such stocks and bonds two years ago. Their price value today is $17,500,000, a net loss of $282,500,000, the *World's* estimates show.

"The price of paper marks declined after the peak, over 3 cents, was reached here, May 26, 1920. The price stayed around $0.02 for a few months and then slipped down in waves until it touched $0.015 on January 15, 1921. There were more flurries which carried the quotations in ten days up to $0.018 and back to that figure on May 12, 1921.

"Then they sagged and sagged and sagged. On September 10 they sold under a cent apiece and at the end of the year for about a half cent. The highest quotation since January 1, 1922, was $0.0059 in that month, and in August they touched their bottom so far, $0.0005—2000 paper marks for a dollar. This month they have been selling around $0.0007—1430 for a dollar. And billions were sold and still are held which cost $3 a hundred marks, millions that cost $5 a hundred and tens of thousands for which American buyers paid $8 and $10 a hundred.

"The buyers never have 'squealed,' never have thrown their billions of marks on the market. Some are still deluded."



(Louisville Courier-Journal)

Another scrap of paper.

According to statistics compiled in Germany, Americans own more paper marks than any other foreigners. The Reichsbank reports that the total issue of the paper marks in circulation on September 9, 1922, was 245,000,000,000.

Actually outside Germany, the Reichsbank reports, there are 25,000,000,000 to 30,000,000,000.

In Germany, but owned abroad, there are 50,000,000,000 to 60,000,000,000, is the Reichsbank estimate.

The Reichsbank reports that 50,000,000,000 paper marks are invested in German stocks and bonds held by foreigners.

Holdings Outside Germany

THE Dresdner bank estimates that paper marks actually held outside Germany number 50,000,000,000 to 60,000,000,000.

World-wide holding of these marks, outside of Germany, the Dresdner bank thus estimates (apparently proportionately as the total exceeds the Dresdner maximum of the total):

America	30,000,000,000
Holland	5,000,000,000
France	5,000,000,000
Belgium	5,000,000,000
England	5,000,000,000
Switzerland	5,000,000,000
South America	5,000,000,000
Scandinavia	3,000,000,000
Spain	2,000,000,000
Russia and Poland	1,000,000,000
Total	66,000,000,000

Most of the paper marks owned by Americans were bought from Holland, France, Belgium, England, the Berlin banking authorities report.

Biggest of the speculators in paper marks have been New York and Amsterdam.

There were two phases, according to the *World,* in the American speculation in German paper marks:

"Immediately after the armistice America bought direct from Germany, through the occupied area and through Holland, at the rates of ten to thirty marks for a dollar ($0.10 to $0.033 per mark).

"The other phase was in the last two years in which America has been buying from other foreign holders.

"The actual amount of dollars invested daily in German paper marks has been decreasing as the mark fell below an exchange price of 100 for a dollar ($0.01 per mark).

"As most of the American holders of paper marks did not buy directly from Germany, no German source of marks distribution can give the exact total sum of dollars invested or the amount of the American losses.

"London figures show that the British investment in German paper marks, up to Nov. 1, 1921, was £200,000,000. The price had declined on that date to about fifty cents a hundred marks, $0.005 per mark. (If estimated on exchange value of $4.20 to the pound sterling this would represent investment of $840,000,000 and loss of $672,000,000). The British loss is put at four pounds in very five invested.

"President Gutmann of the Dresdner bank estimates that the total of paper marks held outside of Germany were bought at an average price of 150 to 300 for the dollar ($0.0066 to $0.0033 per mark).

"[The paper mark price here never fell as low as $0.0066 until Sept. 10, 1921, and first touched $0.0033 on Nov. 21, 1921, after the American buying boom was over.]

"Germany's reparation payments total to date, 1,535,000,000 marks, made in 89,000,000 gold marks and 1,456,000,000,000 marks made in foreign currencies, $365,637,000.

"The German Government—buying foreign currencies for reparation and also for food supplies since the end of the war, and buying through more than a thousand banks—would have difficulty in arriving at an accurate estimate of the prices at which currency for food was bought. The Government has been buying foreign currencies constantly since the mark was selling at ten for the dollar ($0.10 per mark).

"The Dresdner Bank informs the correspondent of the *World* that German capitalists have actual holdings outside of Germany totaling 1,200,000,000 gold marks ($285,840,000), exclusive of their capital still held under sequestration.

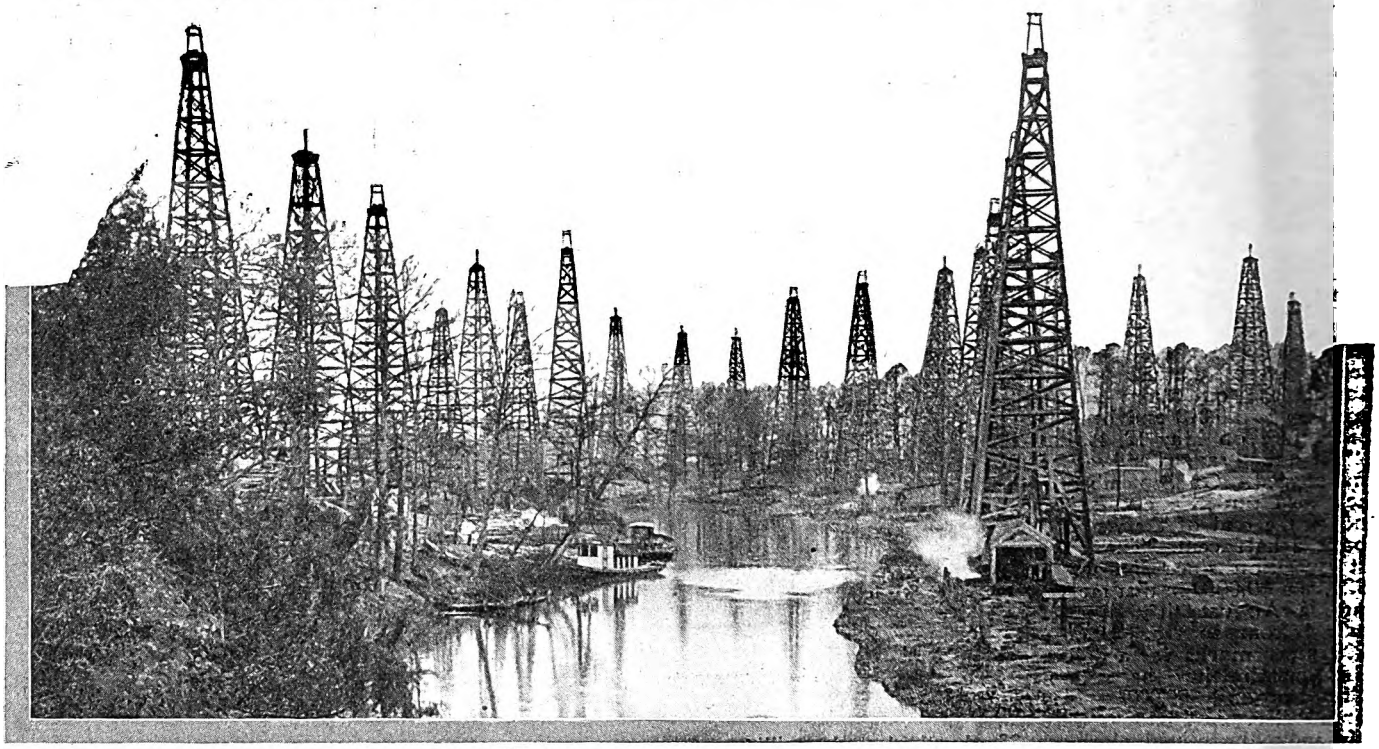
"Differing estimates of paper marks held abroad as made for *The World* by the Reichsbank and the Dresdner bank officials are not in contradiction. The apparent conflict is readjusted by crediting the Reichsbank with estimating that 15,000,000 of the maximum of paper marks held abroad as put down by the Dresdner bank are held in Germany instead, which calculation would leave their estimates non-conflicting."

Financial observers are inclined think it improbable that the mark will return to a high level. If Europe ever returns to a gold standard, the paper mark, they think, will either be repudiated or redeemed at a low level, and a new value set for the gold mark.

But the best financial observers are liable to gross error. Perhaps, after all, the mark will rise. Many of those who hold German paper still believe in it.

When Oil and Water Mix!

The appearance of salt water in the Mexican oil fields is a warning of exhaustion of the pools—how this will affect American oil interests



Getting ready for the coming age of oil. These derricks dot the landscape at the great oil fields at Goose Creek, Texas.

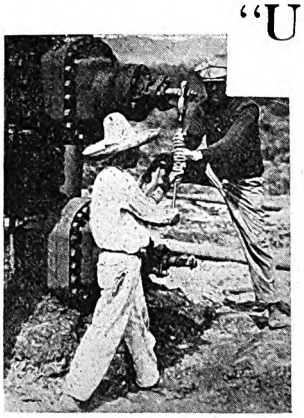
THE oil wells of Mexico, the second largest petroleum producing country of the world, are almost exhausted. Early in 1921 a tradepaper expert estimated that the important wells of the country could be expected to produce only 225,000,000 barrels more—only 22,000,000 barrels more than Mexico produced in the year 1921. Salt water—generally a sign of exhaustion—has now appeared in nearly every territory now being exploited, and the oil trade agrees that unless new fields are developed Mexico is just about through as an oil producer.

What effect will this situation have upon the American oil industry, and the industries that use petroleum products? Two points come to mind immediately. First: the oil trade is suffering from a surplus, and waning production in Mexico will help relieve the over-supply. Second: Mexican petroleum is used largely in the production of fuel oil, and the failure of that source of supply can be expected to send the price of fuel oil up, just at a time when the use of oil as a substitute for coal is spreading.

There are two obvious results to be expected of the Mexican situation. Its total effect will certainly be broad and deep. The American oil industry is inextricably tied up with that of Mexico. It has created markets for the Mexican product, and in normal times depends upon Mexico for the satisfaction of the varied demand. American capital is deeply interested in the Mexican fields, and the failure of those fields will have its effect on the entire American investment market. The political relations of the two countries, too, are closely connected with the oil situation.

This matter was brought forcefully before the general public not long ago when *The Lamp*, house organ of the Standard Oil Co. of New Jersey, published an editorial on Mexican oil in the course of which the statement was made that the oil companies now face a loss of at least half of their original investment in Mexico. The entire list on the New York Stock Exchange suffered a reaction when this article was published.

"In the producing fields of Mexico," said *The Lamp*, "exhaustion of oil resources has reached such a point that the exploitation of at least two-thirds of the estimated 25,000 acres of the producing area has been abandoned. In the Panuco, or heavy oil field, where once 125,000 barrels per day were produced, the average is now only about 100,000. In the Southern field, Mexico at one time produced as much as 500,000 barrels of light crude oil in a day. Within the last few weeks, this has been reduced to less than 300,000 and is still declining rapidly.



"UNDER existing conditions, only a part of the huge investment which the operating companies as a whole have made in Mexico will ever be returned to them. In this connection, it must always be remembered that apparent profits from the operation of oil wells or other mineral deposits do not and cannot become actual profits until the sums invested in the enterprise have been completely amortized. It is safe to assert that few, if any, of the existing oil companies have been reimbursed for their original investment up to the present time, and that collectively they now face a loss of not less than one-half of the original investment. The story of the insolvent companies and of the great losses suffered by many others of the producing companies in connection with their Mexican oil investments as evidenced by the annual reports of some companies and the court records in

regard to others, tells something of the situation in which the companies find themselves today. It is no exaggeration to say that if the companies had foreseen the conditions which now exist, they would never have invested the capital which has gone into the development of the Mexican petroleum industry.

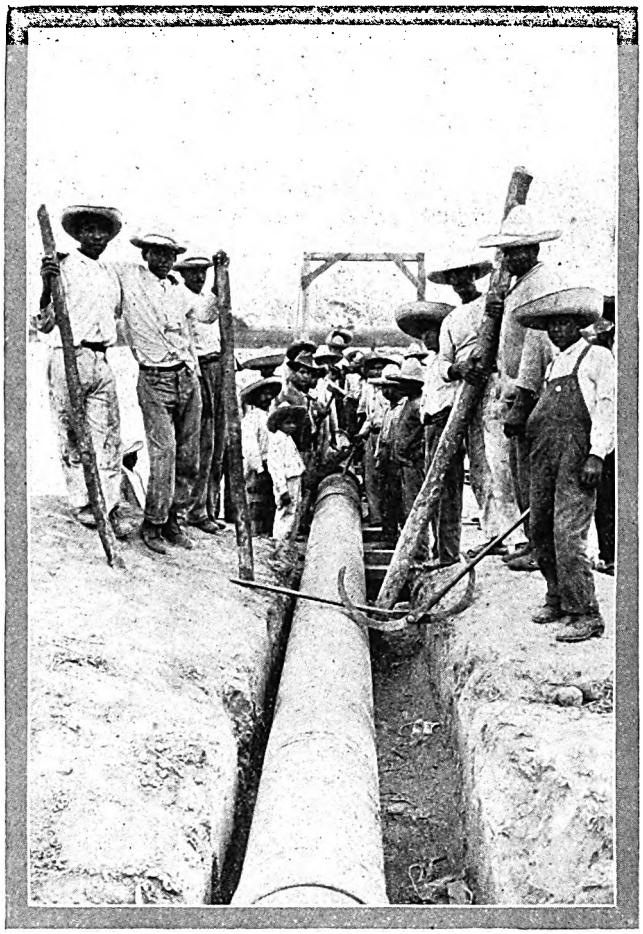
"The present situation is critical because the progressive exhaustion of the production has not been compensated by the exploration of new territory and the discovery and opening up of new fields. The oil industry will have no future in Mexico unless an intensive effort to find new fields of production be undertaken and successfully prosecuted. The areas to be explored are more remote from the ports of shipment than those now producing, and the necessary development work can be carried through only by expenditure of a vast amount of new capital.

"It is essential to the permanency of the petroleum industry, as known fields begin to be exhausted, that reserves for the future be discovered by the extension of operations to other prospective areas."

In another article in the same issue, *The Lamp* tells the history of the Mexican fields, and describes in detail the present situation. In December, 1918, it says, eight years after the discovery of the biggest wells and the beginning of large-scale production, salt water began to appear in the wells of the more southerly of the two great Mexican petroleum districts. As 1919 progressed—

"The salt water level rose steadily until by the close of the year the entire northern end of that field was practically drowned out and only a few of the shallower wells, most of them in the southern part of the field, remained intact. By January 1, 1920, a rather sepulchral atmosphere had become noticeable in certain parts of the Southern District. Dos Bocas, a suicide, had long been dead; Potrero del Llano had more recently passed away; the Tepetate-Juan Casiano field was gasping for breath and the Southern Chinampa-Los Naranjos field had heard the first call. Alamo was in quarantine, leaving Cerro Azul isolated as the only pool with a clean bill of health.

"Salt water is by no means rare in the world's oil pools and there are many instances of production continuing for years with large percentages of salt water. In Mexico, however, the large volume of gas present in the oil under high pressure cause the formation of an emulsion from which the water will not settle out by ordinary methods and the percentage increases so rapidly to almost 100% salt water that production of a mixture for special treatment by the various known methods is not practicable."



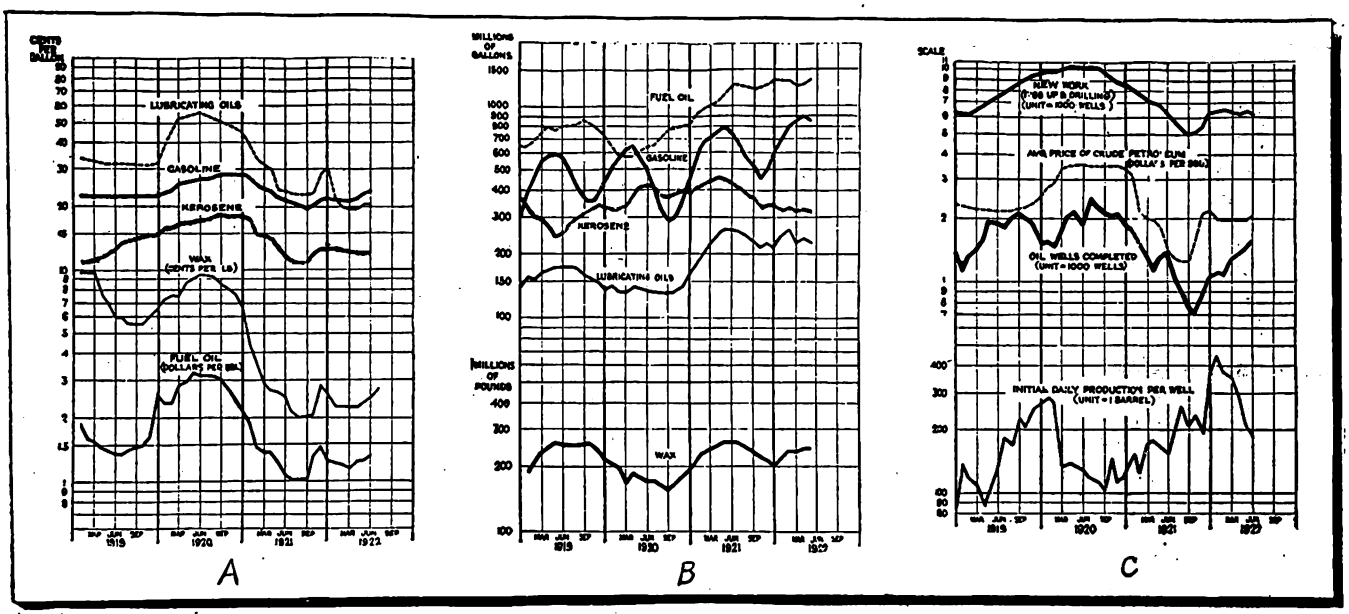
(Brown Bros.)

Peons laying a pipe line from an oil well direct to the pier at El Barco, Mexico, where tankers get the "black gold" that finds its way to the States.

The appearance of salt water made it evident that the fields would be exhausted earlier than most persons had expected, and therefore frenzied drilling followed. The oil men rushed to get as much as possible out of the ground before the subterranean pools were ruined.

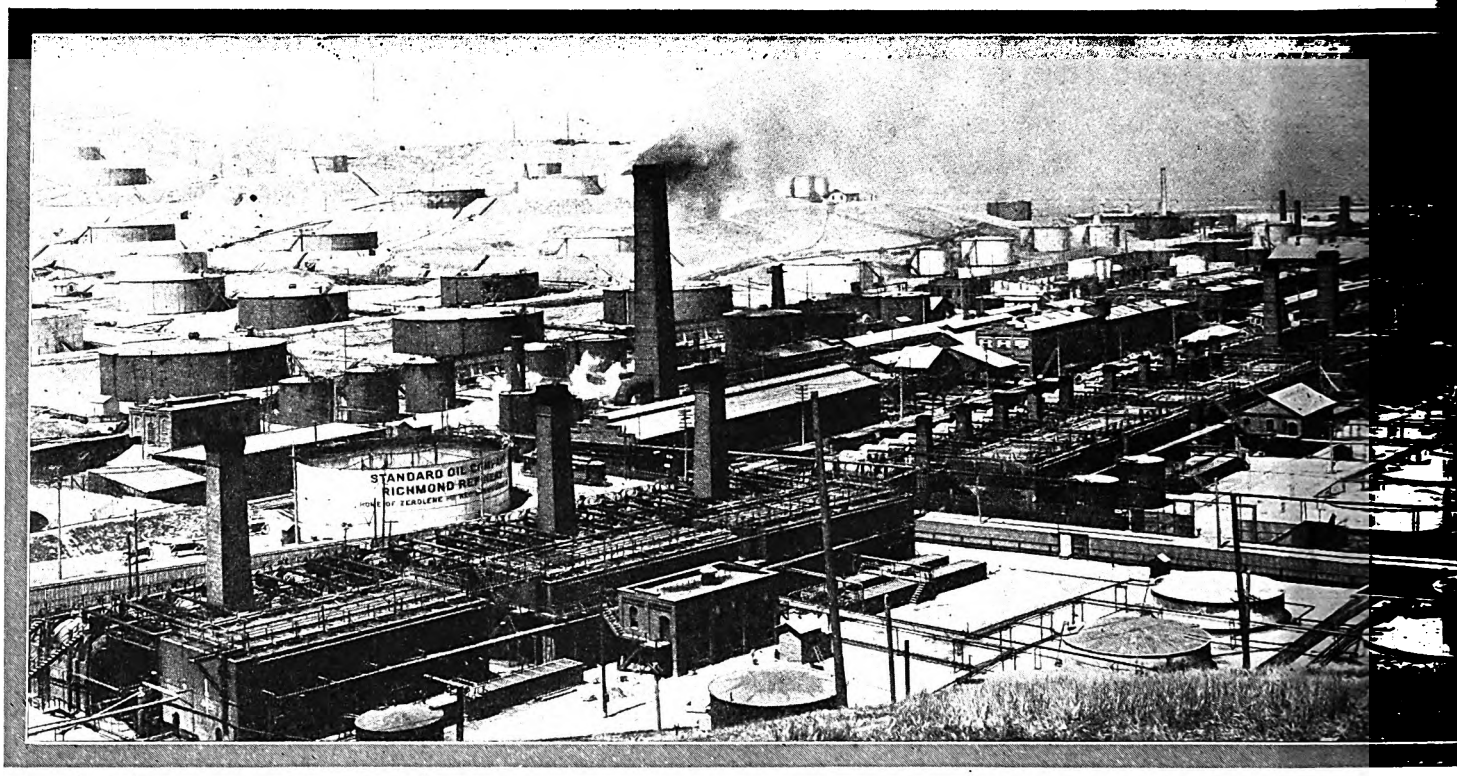
The northern district followed a course similar to that of the southern. *The Lamp* summarizes the prospects of both fields, as follows:

"The production and well data given in the statistical



(Oil Weekly)

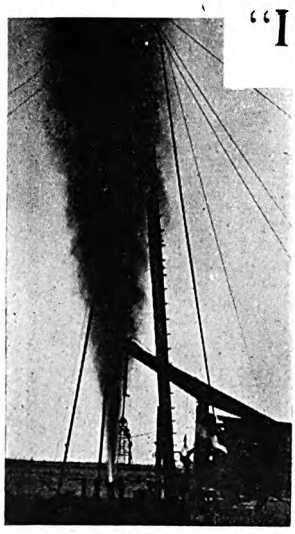
Prices, stocks and drilling activities of petroleum products remain at normal high levels. A—Prices of refined products, 1919-22; B—Stocks of refined products, 1919-22; C—Drilling activities, 1919-22.



A landmark of the American petroleum industry. One hundred tanks and fifty smokestacks contribute

summary table shows that in the first twenty-one years of the twentieth century approximately 762,000,000 barrels of oil were extracted in Mexico from a little over 500 wells.

"This is certainly a commendable past record. By the middle of 1922, however, it is found that the Mexican petroleum industry has reached a crisis in its career, and the outlook for the future is full of uncertainties. Of the several big southern district fields the only territories not reduced to stripping fields by salt water invasion were part of Cerro Azul and Tierra Blanca, Chapapote Nunez and part of Cerro Viejo. The new Tierra Blanca Chapapote development of the Huasteca lends promise of a productive unit there, but with this exception, the southern district gusher production is gone. Under the most favorable circumstances the proved portion of the southern district belt does not provide any foundation for another decade of operations for the oil companies generally.



"IN the northern district fields the situation is somewhat similar. The Topila field has been reduced entirely to stripping and the Panuco field, although producing about 100,000 barrels daily, has shown salt water all through the field and most wells are producing with pinched valves. The discovery of the new area in Palangana, between Panuco and Topila, toward the close of 1921, together with the generally irregular and spotted nature of the productive conditions in this area suggests that similar new developments may be hoped for during a period of several years in the broad Panuco-Topila area of structural disturbance. Drilling activities in the Panuco-Topila area increased markedly during 1921, and prospects for 1922 point to a still greater manifestation of interest in the properties surrounding the proved production on all sides."

Valentine R. Garfias, manager of the Foreign Oil Department of Henry L. Doherty & Co., surveyed the Mexican oil situation in a paper read before the American Institute of Mining and Metallurgical Engineers. Mr. Garfias' views are worth considering in conjunction with the statements of *The Lamp*. He summarizes the situation thus:

"1. The decline of Mexican production may be partly neutralized if the development work now being started proves successful; also, if the result of an intensive drilling campaign between Alamo and Potrero meets the optimistic view held by some operators.

"2. Development of wildcat drilling in northeastern Mexico and the Isthmus of Tehuantepec, although of great importance as to the future supply, should not offset the sharp decline of 1922. Wildcatting is not being carried on in Mexico as intensively as the importance of the industry warrants.

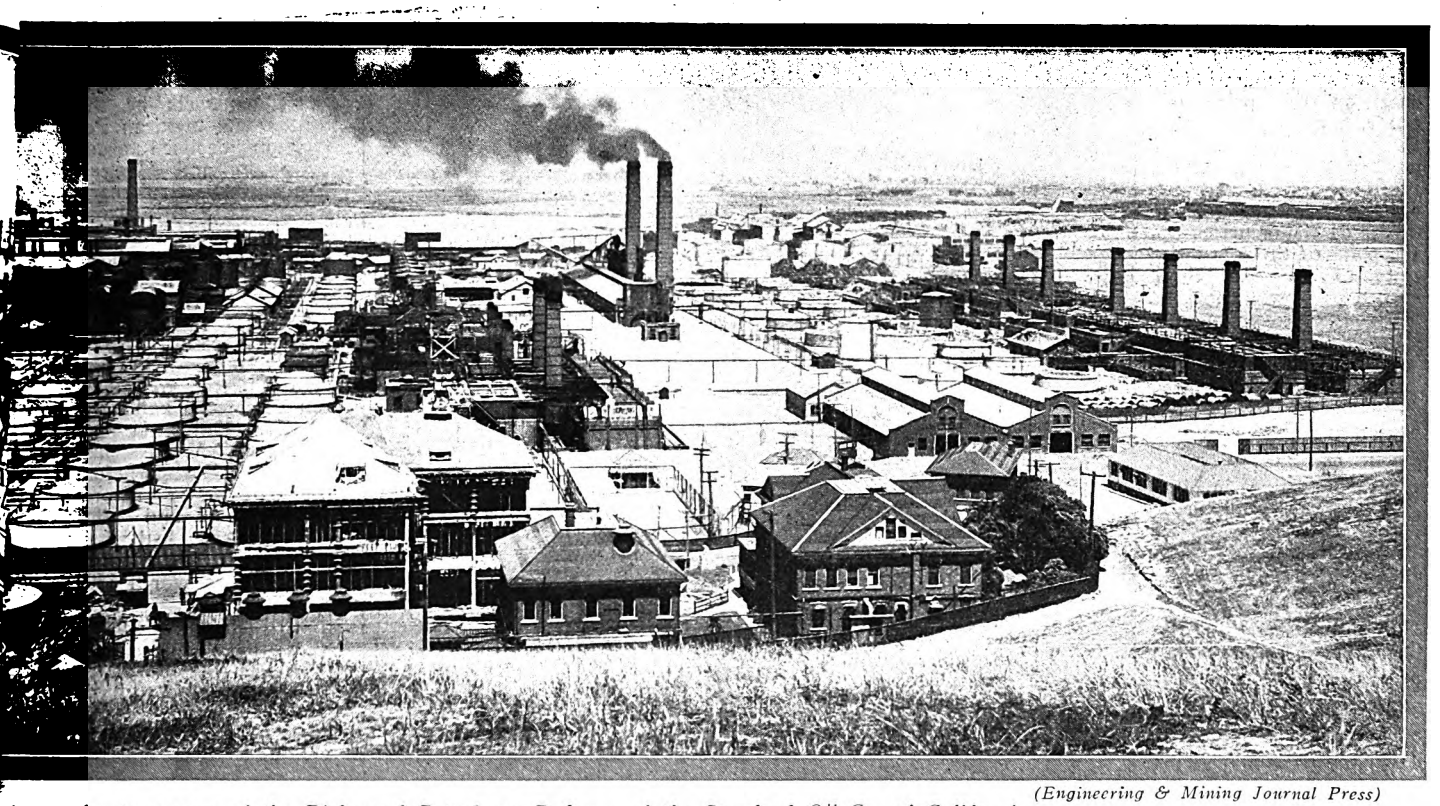
"3. The absolute dependence of the American oil industry, in fact the world's oil industry, on Mexican production, is self-evident and a disastrous effect in the industry from a rapid curtailment of Mexican production will be the logical consequence. It follows that the intelligent development of the Mexican oil fields is a first necessity to the stability of the American oil industry.

"4. Mexican taxation is now levied on a reasonable basis, which will do much toward stabilizing the world's petroleum industry, which is absolutely dependent on Mexican and American production. The new, or export, tax levied for the sole purpose of reducing its foreign obligations, has been in effect since July 1, 1921, and must be paid by exporters of Mexican oil either in cash or in Mexican bonds.

"5. Perhaps the outstanding feature of the Mexican operations during the last year has been the friendly undertone that has prevailed in all matters in which American operators and the Mexican officials have come in contact, this being due primarily to the radical departure from the old practice prevailing for many years when both the Mexican Government and American operators were dealing through intermediaries, mostly attorneys, whereas all dealings during the last year have been transacted between Secretary de la Huerta of the Obregon Cabinet and the presidents of five of the leading American oil companies."

The drop in Mexican production will be beneficial to the American oil industry, in the opinion of Barnabas Bryan, writing in the *Magazine of Wall Street*. Mr. Bryan predicts an era of great prosperity for the petroleum producers of this country. He writes:

"When the drop in the production of Mexican fuel oil makes itself felt throughout the trade, there will be a pro-



(Engineering & Mining Journal Press)

impressive panorama of the Richmond Petroleum Refinery of the Standard Oil Co. of California

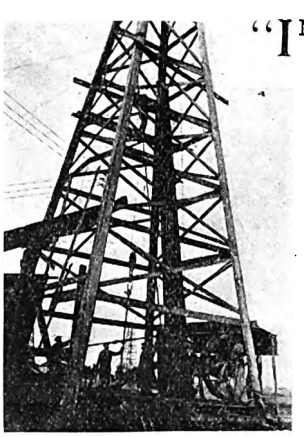
found difference in the market situation. Heretofore, gasoline has been the one product which has crowded the output of crude. With a reduction in imports we will still see the vast market created by Mexican fuel oil waiting to be filled. The industry will feel the new factor of a fuel price which may even pass the price of crude. The refiner will feel the difference through the emptying of his fuel storage and a profit from that product which has been his wrost burden. The loss of thirty millions of barrels of fuel oil per year would empty fuel-oil storage in a year.

"Even if we replace Mexican oil by the American product there will still be a shortage of fuel oil. Mexican oil carries eighty per cent or more of fuel oil whereas average American carries less than fifty. The accompanying chart is interesting in this connection as showing what may be in store for us. The curves are computed by assuming that the same amount of oil was refined, that consumption remained as existed and a part of the crude run was changed to average American oil. Starting at the middle of 1920, when Mexican imports suddenly increased and assuming that two million barrels of the Mexican oil run was replaced by two million barrels of American, the dash-line shows stocks of gas and fuel oil as they would have been. Assuming that four million barrels per month of Mexican had been replaced by four million barrels of American and translating the result into stocks we get the dotted line, which shows that in the beginning of 1922 the refineries would have had to increase their operation to meet the demand for fuel oil, while the gasoline produced would have produced a glut. But American oil gives more gasoline per barrel than Mexican by between two and three times, which shows, that if Mexican imports decrease as much as seems probable, we may have to overproduce gasoline to get fuel oil to satisfy the demand. Thus fuel oil may become the lead horse of the team, with a price above that of crude, and sufficiently high to gradually reduce consumption.

"As this state of affairs manifests itself the whole industry will take on a more healthy tone. With gasoline remaining at relatively the same figures and other products following their normal course, every ten-cent advance in the price of fuel oil will justify a corresponding advance of six or seven cents per barrel in crude. This will be the transitional stage which will last until conditions in the coal industry become normal and fuel-oil demand is able to adjust itself to the new prices. Then the prices of fuel oil and gasoline will pull together for a period of sane normal prosperity of the industry. The danger of the situation is that this fuel demand will carry prices to a point of inflation, followed by another glut and a succeeding deflation.

"One of the peculiar points of the Mexican situation is that the industry may experience the anomaly of maintaining a high percentage of its income in spite of the large loss of production. During the time since oil tankers were released from war service, Mexican crude has been thrown on the market for what it would bring, just as if there were a boundless supply. The American market has been killed and many millions of dollars were lost to the industry in Mexico as well as in the United States, just because oil which was costing a few cents to produce was thrown on the market without including in its selling price a proper amount for amortization and depletion in the Mexican fields. It was just another example of the blind, ruthless destruction of natural resources which has characterized this country's development.

"But now that salt water has spoken in no uncertain terms and the rate of production is limited, the price has advanced to a figure more nearly approaching the value of the oil. The Mexican companies are at present learning the meaning of price, with a degree of pleasure which should mean that even though more pools be found, there will be no further flooding of the market. During the coming year we may witness a reduced production sold at a greater ultimate profit (??) simply because 90,000,000 barrels of oil sold at $1.00 to $2.00 per barrel is a more profitable operation than 200,000,000 barrels sold at 25 to 50 cents per barrel.



"IN spite of the fact that the huge stocks in the United States must be held for an indefinite period before their cost can be realized, the American industry is likely to see a period of prosperity, for it will soon be in a more normal condition as the fuel-oil demand passes ahead of the supply. It is as if the industry had been carrying a load of fifty millions of barrels of fuel on its shoulders, while in the near future it can use this wasted energy for constructive purposes.

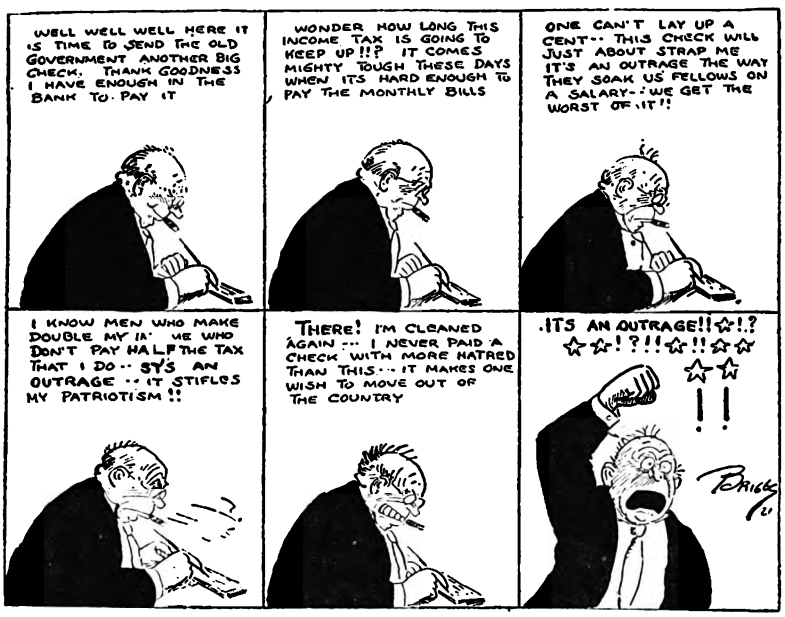
"In the long view these stocks are a wonderful asset, especially to the companies owning them, for they guarantee the stability of the refining industry and the profits to be made through retail distributing systems. They mean that in spite of any mishap to production a considerable period of safety exists during which a new search for pro-

Is Industry Over-Taxed?

Some arguments presented by the Committee of Manufacturers and Merchants on Federal Taxation

IT'S easy to say that taxes on industry are too high. They certainly are. But it's not so easy to devise a means of bringing them down. Therefore it is worth while to listen to anyone who has an idea on this subject.

A group of business men, with headquarters in Chicago, have some definite ideas. They have formed an organization called The Committee of Manufacturers and Merchants on Federal Taxation (Inc.) which publishes a little newspaper called *The Bulletin*, in which the committee's ideas are expounded.



(Chicago Tribune)

A very moving picture of a man making out an income tax check.

Briefly, the committee's view of taxation is this: Income taxes, commodity taxes, personal property taxes and the present form of realty taxes are wrong in principle, because they are levied on persons who produce wealth; and the more wealth the taxpayer produces the more he has to pay. We should substitute for these levies a tax upon the value of unimproved land, not a tax on the productiveness of land, but on the value that accrues to land because of the natural resources it contained, or because of the improvements which have been made on the surrounding land. For instance, land which is valuable because it is believed to contain oil would be heavily taxed; and justly so (the committee thinks) because its value is not due to the labor or investment of its owners, and does not depend upon its productivity.

The committee does more than announce these principles. It has a program for starting to put its ideas into effect. This program is embodied in four bills, which were introduced into the House of Representatives June 2, 1921, by Representative Oscar E. Keller of Minnesota. They are described by the committee as follows:

H. R. 6767

This bill repeals all existing sales and commodity taxes except those on tobacco, distilled spirits, oleomargarine, habit forming drugs and products of child labor. The bill also repeals the present tax on the incomes of corporations.

H. R. 6769

This bill amends the income tax law so as to distinguish between "earned" and "unearned" income. The tax on "unearned" incomes together with the super-taxes is retained, but the tax on "earned" incomes is cut in two. All salaries, wages, etc., together with all profits derived from business personally conducted or in partnership are classed as "earned" incomes.

H. R. 6768

This bill amends the inheritance tax. Beginning with estates of $20,000 to $35,000 there is a tax of 1%; $35,000 to $50,000 2%; $50,000 to $100,000 4%; $150,000 to $250,000 6%, and so on until the point of $100,000,000 is reached after which the tax is about 75% of the entire estate. This bill will raise approximately $750,000,000 annually.

H. R. 6773

This bill provides for a federal tax of 1% on the privilege of holding lands and natural resources worth over $10,000, after deducting the value of all buildings, personal property and improvements. In the case of farms, cost of clearing, draining, plowing and cultivation, together with soil fertility are classed as improvement values. This bill will exempt over 98% of all actual farmers. It also exempts standing timber from taxation whether naturally or artificially grown.

This bill aims to relieve business, industry and agriculture by taxing monopoly holders of vacant natural resources, valuable "sites" in cities and the holding of land in general out of use. The revenue raised under this bill will be about $1,000,000,000 annually.

This revenue program would relieve producing business of about $2,000,000,000 annually, and the people of from three to five times this amount in inflated living costs.

In support of this program *The Bulletin* cites the tremendous increase in State and municipal taxes which has taken place in the past few years.

Chicago's taxes, it points out, have increased 106% in the last three years,—the last general levy for city and county aggregating $100,820,082. The estimates for the next year however are $143,530,679—or an apparent increase of almost 44%.

New Jersey's taxes—both State and local—amount this year to $163,944,939—or over $17,000,000 more than has ever been collected before. This sum amounts to over $51 per capita, or more than $250 per family of five.

In Michigan taxes have increased 153% in five years. Since the adoption ten years ago of the plan to issue bonds to keep the tax rate down the city taxes have increased practically 300%. A decade ago Michigan had no public debt. Today the interest on the public debt is nearly equal to the total cost of government in Michigan 20 years ago.

In a speech before the City Club of Chicago on September 30, Senator Borah gave a list of ten States whose per capita tax had increased in six years from 90% to more than 400%.

State	Per capita tax 1915	1921	State	Per capita tax 1915	1921
Montana	$7.06	$12.80	Vermont	$7.85	$14.12
Nebraska	3.78	10.83	Wyoming	7.00	24.00
New Hamp.	4.89	14.00	Idaho	5.00	16.00
Oregon	6.40	26.74	Illinois	3.00	7.00
So. Dak.	5.24	20.12	Minnesota	7.00	17.00

"We cannot go on at this rate," said Senator Borah, "and survive. European nations already are bankrupt. And if the present policies of our own national and State governments are not changed at once and this orgy of extravagance stopped, we will face a crisis of great danger."

Canada's Industries Booming

In many lines our northern neighbor is becoming a serious competitor

THE annual production of Canadian manufacturing industries shows a healthy and steady increase for the better, until it now amounts to approximately $400 per capita, while the country's exports equal $150 per capita, or the highest in the world.

Ever since the opening of this year Canada has given various indications of a return to more normal and prosperous conditions, and there can no longer be any doubt but that these signs will be borne out in substantially increased production by the end of the present year in practically every resource and manufacture.

This awakening and activity has been evidenced in nearly all the lines of industry of Canada, and in none has it been so pronounced as in the expanding industrial field, marked by the establishment of manufacturing. Industry is striding apace with agriculture and manufacturing assuming a more important place each month in Dominion life.

The present year has focused upon Canada and her opportunity a more than usual attention from trade interests, not alone to the Canadian domestic trade, which is comparatively small, but to the export market, which, by virtue of Canada's stragetic position, is expanding rapidly. One of the outstanding traits of the year has been the desire evinced by the United Kingdom to increase trade with Canada, which came happily at a time when certain Canadian products were barred from the United States market by the so-called "Emergency Tariff," and when Canada was finding it necessary to locate new markets and to stir herself to develop trade within the Empire. This new interest has not only had the effect of bringing manufacturers from the British Isles to establish in Canada, but has stimulated the expansion of American interests in Canada to meet the competition.

New Industries Mark Progress

IN the year 1921 a total of 1,081 charters were granted new companies commencing operations in Canada, the whole representing a capitalization of $824,000,000. This year, during the first six months, new incorporations have approximated $20,000,000 per week, and it would seem as if 1922 were sure to create a record in this respect. At the end of 1921 it was estimated that there were about 800 branch plants of American industries operating in Canada, and about 250 branches of English industries. Since the opening of the year, the British Isles, through the visits of various trades interests and manufacturers' representatives, has been brought to realize the expediency of following United States trade methods in Canada, and there seems reason to expect in the near future the establishment of many more British branch industries in Canada.

Meanwhile, the locating of new United States industries goes on unabated as more American houses come to appreciate that this is the ablest manner of capturing and holding the Canadian market and trading with the whole British Empire.

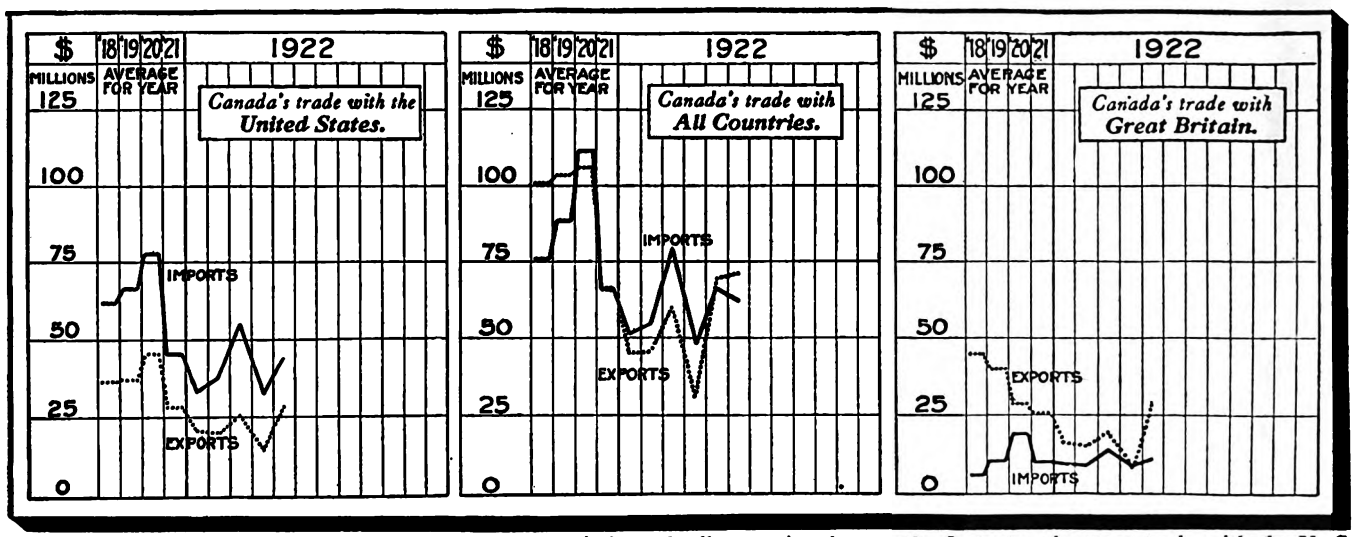
New U. S. Branches

AMONG the many United States branch plants to be established this year is a copper and brass concern at Toronto, cutlery manufacturers at Hamilton and Welland, electric bulbs at Oshawa, hosiery at Guelph, automobile manufacturers at Sarnia, silk mills at Cowansville, auto tire plant at Hamilton, silk dyeing and finishing at Drummondville, and textile dyeing at St. Johns.

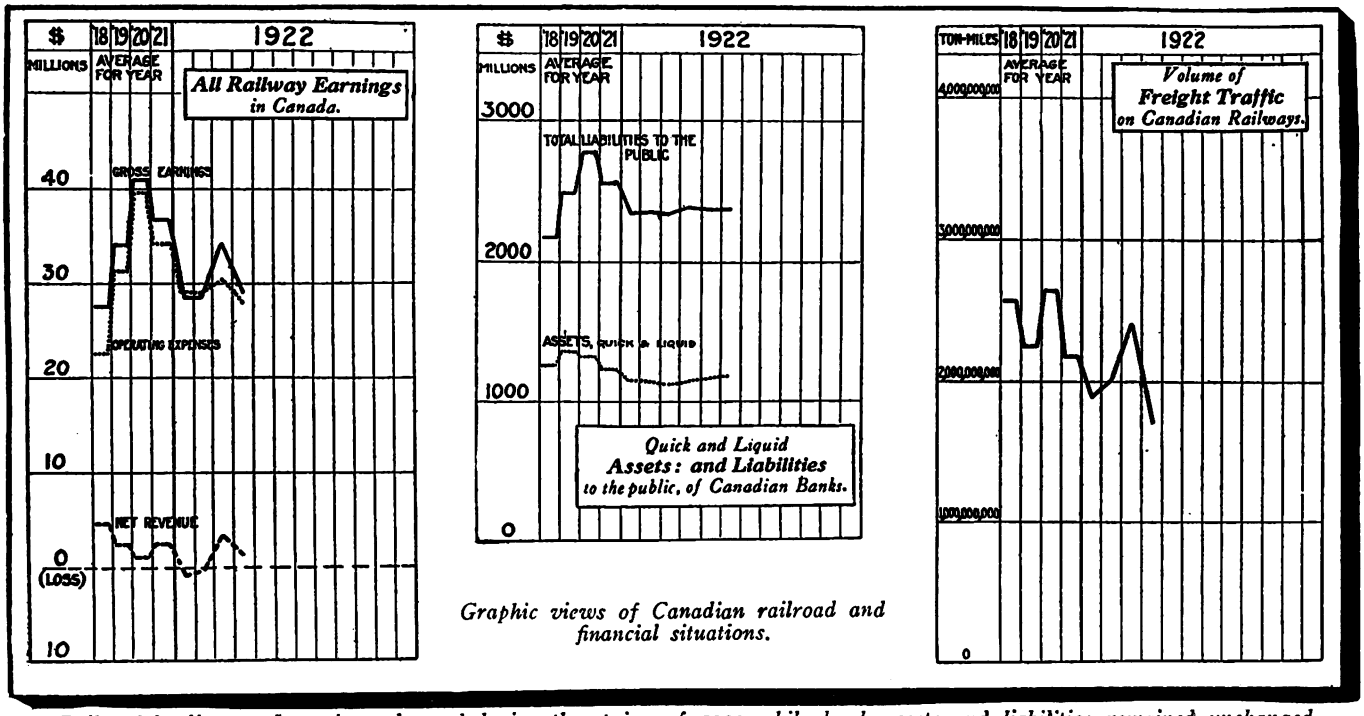
The industrial boom which has hit Canada has favored all sections of the Dominion, and covers practically all phases of industrial activity. This is a tribute to the country as a whole as possessing those qualities which prove attractive to manufacturers and shows that the wide diversity of Canadian natural resources, profusely scattered, makes the establishment of industries in any section profitable.

The border cities, always regarded in great favor among American manufacturers, have recently experienced a substantial expansion to their automobile industries through the doubling of the capacity of the Ford plant and the location in that section of the Dodge company. The eastern townships of Quebec are developing as the premier textile center of Canada almost solely through the establishment here of United States concerns, many of which have located since the beginning of this year.

As the result of the campaign waged by the Canadian Government with the object of educating British manufacturing, half a dozen branch plants of English manufacturing concerns are announced as locating. In addition, an English automobile concern is to enter into competition with the United States firms manufacturing in Canada, and there is a possibility of



Record of Canada's trade with United States, Great Britain and all countries since 1918. Import and export trade with the U. S. run almost parallel courses. Total exports exceeded total imports in April of this year for the first time since 1919.



Graphic views of Canadian railroad and financial situations.

Railroad loadings and earnings slumped during the spring of 1922 while bank assets and liabilities remained unchanged.

an English firm establishing a lace-making industry in the near future.

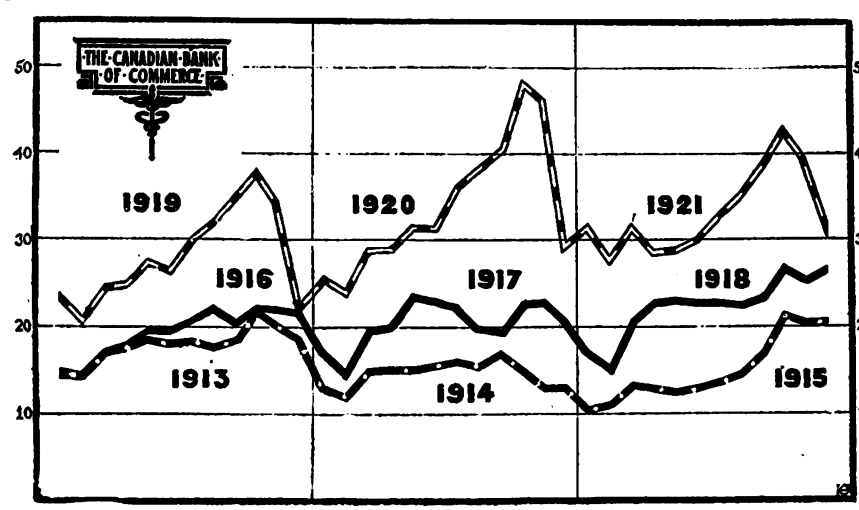
The virtual ban existing in the United States against the introduction of Canadian produce has brought home to Canada the wisdom of becoming independent in this regard. The full result of this will only develop in the course of time, but already Canada has in sight the manufacture of her wool into a state ready for her textile mills, a work previously performed in the United States. The same desire has to some extent expanded the manufacture of asbestos products in Canada, the extension of the existing industry in the eastern townships of Quebec now being in a position to supply all Canadian requirements.

Altogether Canada has reason to be exceedingly gratified at the manner in which the Dominion has been favored this year by manufacturers in other countries, which would indicate a remarkable expansion in the country's industrial output within a very short period. Just how important Canadian industry looms in the national life can only be estimated from a consideration of the fact that while in 1921 the agricultural production of Canada was valued at $1,396,223,000, the industrial output in 1919 was worth $3,520,724,039. Industry's growth in Canada is seen in a comparison with the figures for the years 1870 ($221,617,773) and 1900 ($481,053,375).

As Canadian agricultural development is largely based on immigration, so does the importance of Canada's industry increase with greater production and a swelling domestic consumption. Canadian agricultural and industrial progress have always gone hand in hand. Consistent annual increments in the value of agricultural products have been reflected in proportional increases in industrial output. The strength of the incoming human tide of industrial and agricultural workmen is found to correspond largely with the influx of foreign capital to finance new enterprises.

For many years Canada has had a healthy immigration. For the same long period of time her agricultural production has increased by leaps and bounds. Similarly the manufacturing industry has become yearly more and more important in the national life, and at the present time Canada is fast reaching a state where she will be in a position to manufacture practically her entire needs.

The history of industry in Canada is one of progress consistently maintained. In 1870, when the first industrial census was taken, there was in the Dominion, as it existed at that time, a capital of $77,964,020 invested in industry, employing 187,942 employees, who received $40,851,009, accounting for an annual production valued at $221,617,773. In the half century which has elapsed since that and the last census, the capital invested has increased by more than 4,000%, and the annual production by nearly 1,500%.—E. W. G.



Canadian railway earnings, 1913-21.

Railway Earnings in Canada

Monthly changes during the years 1913 to 1921, in the combined gross railway earnings of the Canadian National Railways and the Grand Trunk Railway are shown in the graphic illustration opposite. Taking into account the inflated values of the merchandise handled during the years shown in the uppermost line and the series of increases and adjustments in passenger and freight rates, one can obtain a very fair idea of the expansion and contraction of the country's business during recent years.—*(The Commercial Review.)*

World's Greatest Power Project

The new Dixie Dam will be even larger than Keokuk

IN the State of Alabama is the largest power plant in the world, at Keokuk. During the period of its construction the attention of all the engineers of the country was focused on it. This plant was the largest thing of its kind that had ever been attempted so far. When completed, it supplied electric power to hundreds of cities and innumerable factories.

And now, in northern Arkansas on the White River, there is now under construction a project which will be even greater than Keokuk. Whereas Keokuk is a power plant, for supplying power only, the new project will not only supply as great an amount of power, but will also serve as a medium to keep in check the surrounding rivers, which cause enormous damage to both crops and property each year.

The program includes the creation of an artificial lake to be the largest in the world, with an area of 90 square miles, a *350 mile shore line* and possessing all of the attractive features of a natural lake. The completed project will supply the power to turn the wheels of hundreds of factories spread over a wide territory and meet the power demands of cities and towns, from the smallest village to the great metropolitan centers.

The present program provides for the construction of three dams, the largest one across the White River near Cotter, to be known as the Dixie Dam; another across the Buffalo River, 12 miles below Cotter, and a third on the Big North Fork of the White River, 20 miles below Cotter. The combined continuous daily horsepower furnished by the three dams will be 155,000 units. The contemplated construction of five low-head dams across the White River between Cotter and Batesville, Ark., will increase the continuous horsepower to 255,000 units.

"In this vast undertaking," says W. V. Working, writing in the *St. Louis Globe-Democrat*, "the frequently turbid waters of three great streams, natural menaces to industrial enterprise, are to be harnessed and virtually metamorphosed into servants of industry. A large area of rich alluvial land, a great pattern of highly productive farms, dotted with bustling cities and towns, is to be protected from the ravaging flood waters of three great watersheds, comprising 10,000 square miles, and the energy of the streams is to be translated into a mighty hydro-electric force, technically 255,000 horsepower units, readily amenable to the whims of man."

The Dixie dam, which will be located within a short distance of the celebrated Rush Creek mining district, noted for its rich deposits of zinc and lead, will be started shortly after the first of next year and will require two years in building. Its height is given as 253 feet, length at crest 2,000 feet, and base 1,500 feet. The width at the base is to be 200 feet and the width at the crest 36 feet. The dam will be of the monolithic type, of solid concrete, requiring 1,100,000 yards of concrete in its construction. The cost of construction of the Dixie dam will be $15,000,000, and it will have a capacity of 100,000 continuous horsepower. The Buffalo dam will cost $5,000,000 and will have a capacity of 25,000 continuous horsepower. The Big North Fork dam will have a 30,000 continuous horsepower capacity and will cost $6,000,000, bringing the cost for the three dams to $26,000,000.

"When completed," according to Walker Powell, president of the Dixie Power Company, "the series of dams and electrical power plants forming the great power system will be capable of supplying a 24 hour service to St. Louis, Memphis, the whole of Arkansas and part of Missouri and Oklahoma. Electrical power may be economically supplied within a radius of 400 miles."

Large cities and their distances within this radius include: St. Louis, 200 miles; Memphis, 170 miles; Kansas City, 225 miles; Little Rock, Ark., 115 miles; Springfield, Mo., 80 miles; Fort Smith, Ark., 95 miles, and Tulsa, Okla., 175 miles.

Further, Mr. Powell says, "The power system, when completed will constitute as great a primary power as Keokuk or Muscle Shoals. It will provide the equivalent of 500,000 horsepower on the basis of a 50 per cent demand where municipalities and plants are served."

Equal to 3,000,000 Tons of Coal Per Year

HE also made the statement that 100,000 horsepower was equal in energy to 1,500,000 tons of coal per year and, in the average steam plant, equal to 3,000,000 tons per year.

The territory to be drained by the Dixie dam project comprises all that country north of the Boston Mountains, where the average rainfall is 46 inches.

The Buffalo River dam will take care of the surplus waters from a section covering 1400 square miles, where the average annual rainfall is 53 inches. This territory lies south of the White River and the Big North Fork of the White River.

Powell estimates that the dams will easily take care of a flood stage greater than that caused by the great storm which swept northern Arkansas in 1915, chronicled by the Government as a "hardy storm." At that time there was a precipitation of 13 inches in a four-day period, the overflow forcing streams from their banks and causing enormous damage to farm crops and city property. The Dixie dam alone is expected to prevent a repetition of the disaster attending the "hard storm."

The largest lake to be created above Cotter will lie in the heart of the Ozarks and will be 100 miles in length, 243 feet in depth and 2 feet deep 100 miles upstream. At its top the lake will be 800 feet above sea level.

The United States Department of Agriculture has offered to cooperate with the States of Missouri and Arkansas in the establishment of a fish hatchery in the lake and a bird sanctuary in its waters is also contemplated. This would provide a haven for game birds on their way north and south and would, undoubtedly, develop a breeding place for waterfowl.

The Buffalo River dam will be 200 feet in height and 1500 feet in length. The reservoir, or lake, to be formed will be 66 miles in length with an area of 40 square miles. The third dam, which is to be situated at the conjunction of the Big North Fork and the White rivers, will be 200 feet in height and 1600 feet long. The reservoir will be 78 miles long and will have an area of 53 miles.

"An important feature of the construction of the dams," says Mr. Working, "will be the water transportation facilities afforded. Lake C. F. Blanke will give water and rail transportation to 3000 square miles of farming, fruit and mineral lands now inaccessible. Transportation on the Buffalo River will be possible as far as Gilbert, Ark., permitting the tapping of the rich lead and zinc mining territory of northern Arkansas. What is of especial significance, however, is the fact that the inundation of the farming lands adjoining these streams, now subject periodically to overflow from the White, Big Fork, Buffalo and Black rivers, with the resultant loss of hundreds of thousands of dollars and sometimes loss of life, will be virtually eliminated. The submerging of railway tracks and river towns will be avoided and even the low bottom lands, according to the estimates of the engineers, will be protected."

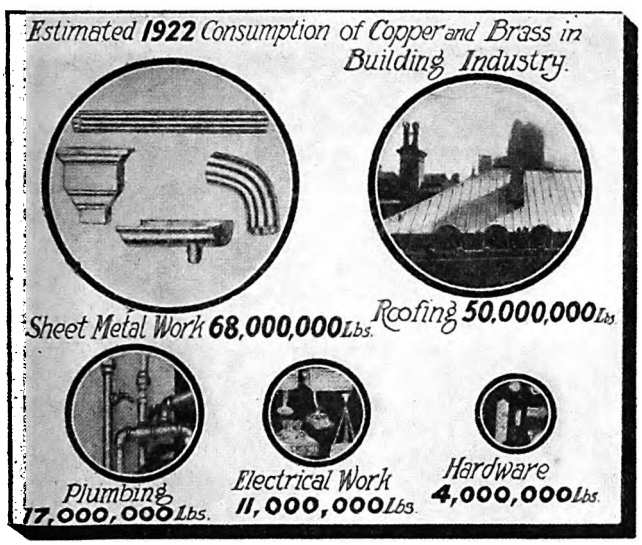
When the entire project is completed, the White River, above Newport, Ark., as far as Forsythe, Mo., will be a placid lake, having a flow of about one mile per hour. This will be true also of the Buffalo and Big North Fork for a considerable distance from their mouths.

Market for "Everlasting Metals"

A Recent Trade Research Shows That the Building Industry Alone Could Increase Its Use of Copper, Brass and Bronze Four Times

THE place of the "everlasting metals"—copper, brass and bronze—in the building industry has been made the subject of an exhaustive research by the Copper and Brass Research Association. While the survey reveals a total consumption in 1922 of 150,000,000 pounds of copper, brass and bronze in the form of sheets, piping, hardware, lighting fixtures, and wires, the size of the potential market for these metals in the building industry alone is announced by the Association as 650,000,000 pounds.

This estimate is presupposed on the condition that all buildings constructed this year are to use the "everlasting metals in those places where, by reason of uniform service,



Estimated uses of copper, brass and bronze in the building and construction trades in 1922.

long life and ultimately lower cost, copper and brass are the logical metals to use."

The estimated consumption of 150,000,000 pounds of copper in 1922 is 100,000,000 pounds greater than the consumption in 1921; and its use will be divided in this manner:

Sheet metal work	68,000,000	pounds
Roofing	50,000,000	"
Plumbing	17,000,000	"
Electrical work	11,000,000	"
Hardware	4,000,000	"
Total	150,000,000	pounds

The recent Government census of industries for the year 1919 further reveals that the above estimate is 73,000,000 pounds greater than the consumption of this metal in the building industry for 1919, and that the amount of copper used varied between 4% and 6% of the total copper consumption of the United States.

The full extent of the building collapse which occurred during 1915-1921 is only now becoming apparent. The accumulated building deficit of those years, together with the normal demands for the current year, have resulted in a program which will cause the amount of construction during 1922 to reach the amazing total of $5,000,000,000. This figure almost doubles the average annual construction for the past six years.

The Copper and Brass Research Association arrives at the conclusion that "only a start has been made toward catching up on the accumulated building deficit, and with increased construction of heavier types of building, even though there may be a somewhat smaller amount of residence construction, we may reasonably expect, during the next three years at least, considerably more than the normal pre-war building activity."

Inventions and Improvements

New Developments in the Industrial and Allied Arts That Are Applicable to Modern Methods and Processes

HERE are some late inventions and improvements that are of interest to manufacturers in many varied lines:

A New Steel Alloy

ACCORDING to the International Bureau of Weights and Measures at Berne, Switzerland, a new alloy steel has been produced which is not affected by heat or cold. The product is made from nickel steel, to which there is added about 12% of the metal chromium and a minute amount of tungsten or manganese. The alloy, made in this manner, will not expand when heated nor contract when cooled. The watch-making industry will be interested in this new development, as, it is claimed, that watches, whose compensating parts are made from the alloy, will keep perfect time.

New Swedish Alloy

A NEW Swedish alloy has appeared on the market in Europe which it is claimed is already supplanting German silver in many of its uses. It is particularly useful in the manufacture of novelties and cheap jewelry. The alloy is made from copper and aluminum, and contains at least 90% of the former metal. It is called "Dizigold." It cannot rust, is not affected by acids or alkalies, and possesses the lustre and color of gold and the hardness and stability of steel.

Plastic Wood

AN English company, allied to the Nobel interests, has put on the market a product, known as plastic wood. This substance can be moulded into any shape or form and is easily worked. All that is necessary to repair broken furniture or the like is to form a mould around the break and fill it with plastic wood. After a few hours, the plastic wood is thoroughly dry. The product is then very hard and possesses all the characteristics of wood, except the disadvantageous one of absorbing moisture. This hard mass can be sawn, drilled, planed, chiseled; in fact all sorts of tools can be used on it, and furthermore nails, screws, etc., can be driven into it without any danger of the wood cracking.

The Mineral Bentonite

THE Government in Washington has paid considerable attention in the recent past to developing uses and encouraging the production of the mineral bentonite, which although occurring in large deposits in the country has not been employed to any extent for technical purposes. One use for this mineral is for removing ink from old paper, such as newspaper. First the old newsprint is treated with soda ash or caustic soda. This serves to loosen up the ink. When a quantity of ground bentonite is mixed with the digested paper mass, and then if the mixture is filtered, the bentonite, because of its extreme fineness and the large area of its particles, passes through the filter and carries the particles of ink along with it. It is claimed that a perfectly clean paper pulp can be produced in this manner.

Interlocking Industries

How Some Industries Dominate and Influence Related Trades, Which Is Particularly Notable in the Case of Iron and Steel

IT is, of course, generally understood that there are some industries which exert a dominating influence over many allied industries. Such an industry is the iron and steel trade, which has come to be generally recognized as the fundamental barometer on business conditions. Then, too, building and construction plays such a vital part in industrial life that fluctuation in its volume of business directly reacts on nearly every other line. It is not so generally understood that the automotive industry has a tremendous effect on most of our leading industries.

The National Automobile Chamber of Commerce has just presented some figures concerning 1921 consumption of materials by the automotive industry which discloses facts of unusual interest to manufacturers in other lines.

The automotive industry uses 1,464,000 tons of iron and steel a year—or approximately 4% of the total output of the country. Forty-three million two hundred and fifty thousand pounds of aluminum were used in 1921 in manufacturing cars and trucks—or 22% of our total output of aluminum. The manufacture of automotive vehicles required the use of 83,425,000 pounds of copper—16% of all the copper mined in the country. One-fifth of all the tin used in the United States is used in the automotive industry—some 12,510 tons a year. The Tanner's Council estimates that 54,000,000 square feet of upholstering leather was our 1921 output, and of this amount 37,165,000 square feet were used in making comfortable seats for automobile and truck passengers. In addition, more than 88,000,000 square feet of imitation leather was used in upholstering (figure that out in acres for yourself).

Although the amount of wood on the average car does not seem to be worth mentioning at first glance, 313,800,000 board feet were used by this mushroom industry last year.

When one speaks of plate glass, one generally thinks of department store windows, but 30% of all the plate glass made in the country, or 16,500,000 square feet was used in manufacturing everything from roadsters to five-ton huskies. It required nearly 6,000,000 gallons of paint and varnish to dress up our motor cars last year, and it took 16,000,000 pounds of hair and padding to make comfortable seats. Aside from these items, 6,670 tons of lead, 3,400,000 pounds of nickel, 5,357,000 yards of upholstering cloth, and 15,330,000 yards of curtain material were some of the items in the raw material bill.

Car Shortage Is Serious

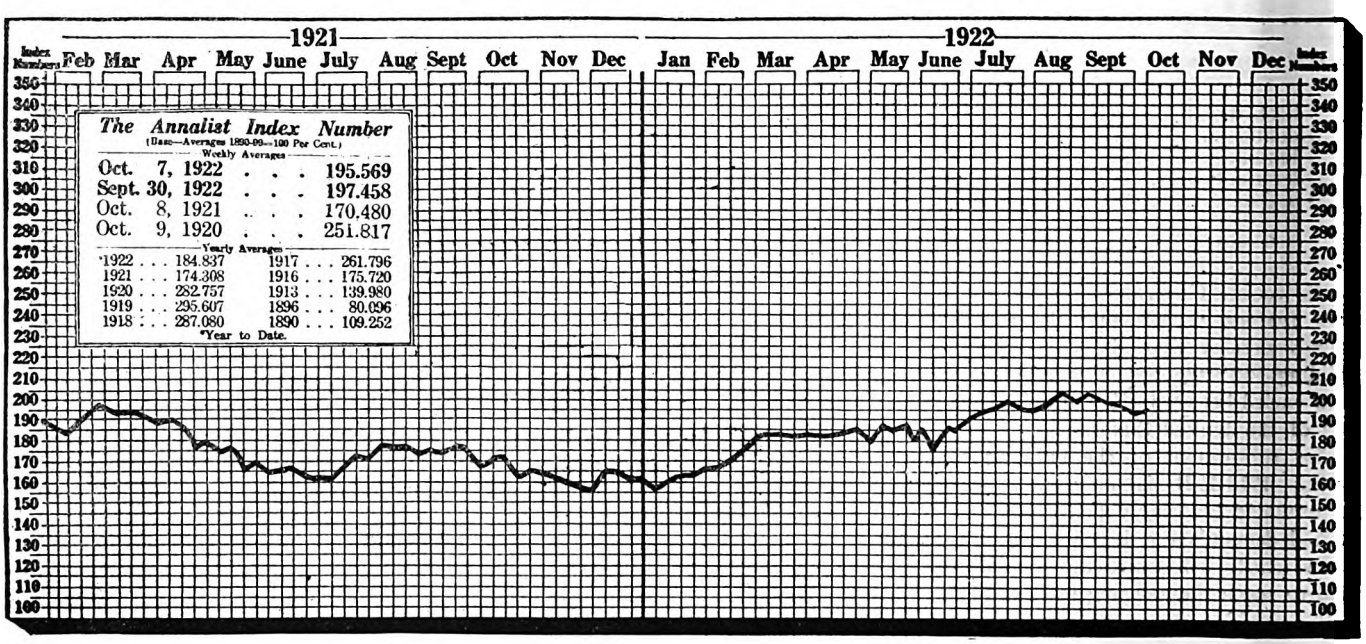
The Surplus of Freight Rolling Stock Has Been Absorbed, and the Shortage Has Already Reached 60,000 Cars

REPORTS of car shortage for recent weeks show that the freight situation is steadily becoming more serious. The surplus of freight cars has been entirely absorbed by the growing demand for rolling stock. The statement for the week ending September 15 reveals a total shortage of more than 58,000 cars. That is to say, there were requisitions for nearly 60,000 more cars than were available. Now, since all indications point to a steady increase in demand for shipments from now until the first of December at least, it is apparent that the shortage is to be a deterring factor.

The Interstate Commerce Commission has been doing its best to help out the situation by means of priority orders. Statements from the Commission indicate that their efforts are directed to facilitating the movement of essential products and the orders which were effective September 21, food for human consumption, feed for livestock, livestock, perishable products, mine supplies, medicines, fertilizers, newsprint, coal, coke and other fuel, and petroleum and its products in tank cars, are given preference over all other products.

The Interstate Commerce Commission now requires all open-top cars to be loaded with coal when traveling away from the mines. There is some talk of modifying this regulation. The bituminous coal shortage has been virtually overcome and manufacturers are in greatest need of open-top cars to handle their finished products. It seems likely that a modification of this open-top ruling will be made shortly.

The roads in the Northwest are exceptionally active in handling the harvest, and roads in the East are taxed to the limit in handling building materials for completion of projects before winter sets in. Christmas shipments are beginning in earnest now and it will be only a matter of a few weeks before embargoes will be put into effect on many of our largest roads, in all probability.



Index line of food cost of living from 1921 to October, 1922.

Bumper Crops Make Farmers Poor

PRICES of farm products during September tended to drop. This led to a renewal of the fear, reported in an earlier issue of THE INDUSTRIAL DIGEST, that the big crops being harvested this year would not prove entirely favorable to business. Bumper crops do not make the farmer happy, nor increase his buying power, unless the prices he can get for the crops are fairly high and the market good.

If the farmer must sell his produce for less than it cost him to raise, and if he is tempted to let some of it lie on the ground, all the bumper crops in the world won't do business any good. It would certainly not be right to say that we face such a situation today, but on the other hand it is necessary to remark that the big crops do not seem to be producing the prosperity in rural districts that some persons thought they would. Farm prices are dropping and the prices of manufactured articles are rising. This is not calculated to restore the disturbed economic equilibrium between farm and factory. Prices must take the opposite course if the farmer is to buy more goods.

Sentiment is mixed in agricultural circles throughout the country, according to the Department of Agriculture. In the range country cattle raisers are fairly optimistic, and stock men are reported to be paying off some old debts this fall. Range shortage in the Southwest is serious in some regions. Alfalfa prices are higher and the number of sheep is increasing.

Cotton is beginning to move to market and growers who have a crop find prices the most encouraging in three years. The main difficulty has been the crop failure; the Eastern belt has been badly hit by the boll-weevil, and the territory west of the Mississippi has had the worst drought in many years.

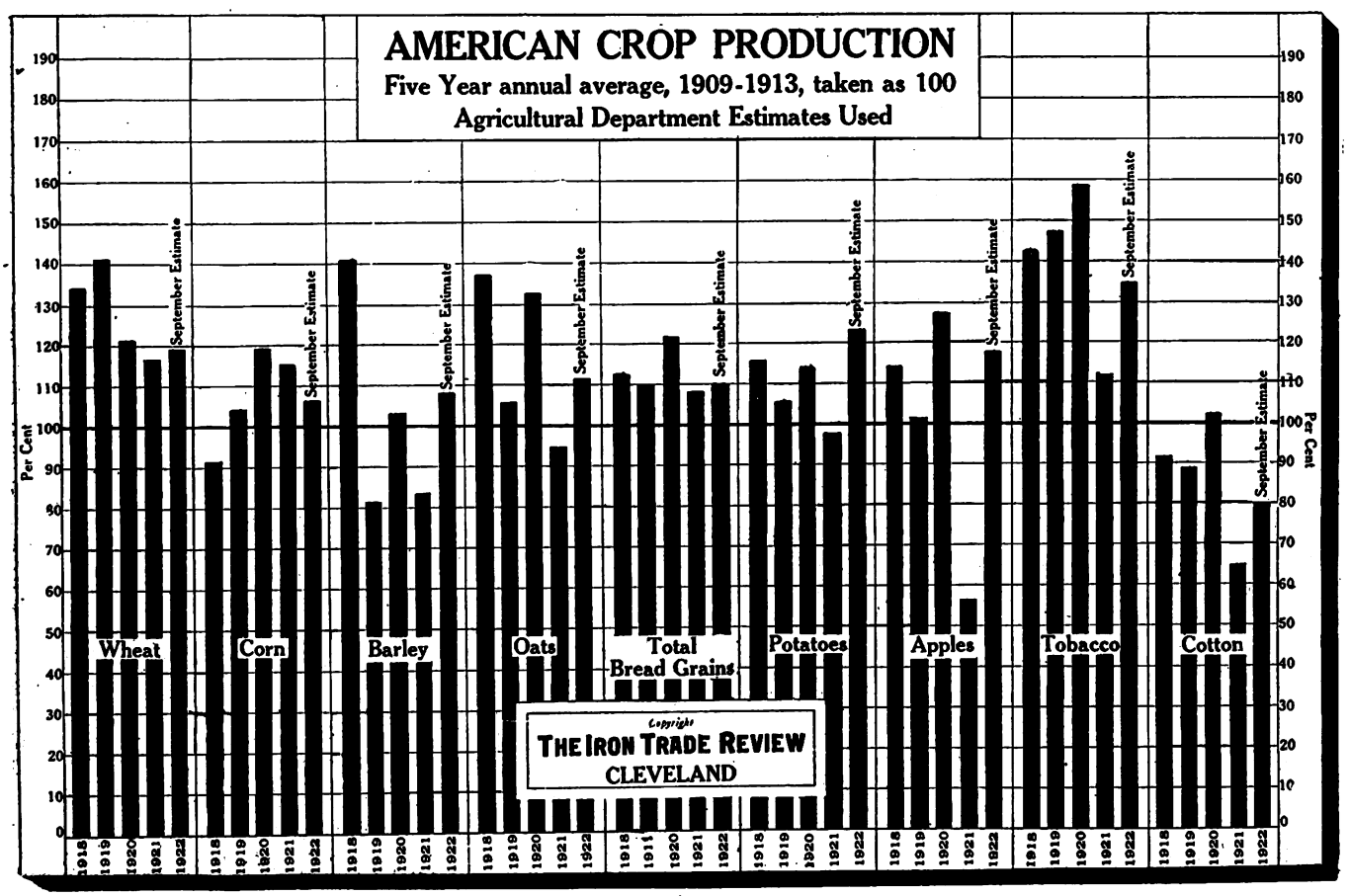
In the corn belt sentiment is mixed. Present prices of corn are discouraging, but some farmers say they can make money this year in hogs. There is a tendency to take on considerable feeder stock. Wheat growers have been discouraged by low prices, and the crop has come into market rather rapidly because of necessity for raising cash. Sentiment on the winter wheat acreage is not yet certain.

Farmers in many localities in the East are pessimistic over the low prices of their crops. The markets are almost glutted with potatoes, apples and cabbage. Milk prices are low and there is a considerable surplus. Feed is fairly cheap, however, and dairymen are paying fairly good prices for fall cows.

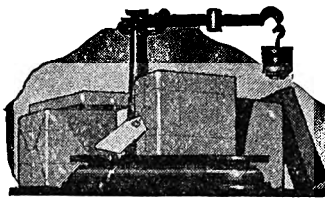
The general outlook is for a normal to heavy harvest of all staple crops except cotton, which has suffered from adverse weather and insect ravages.

The trend of average prices received at the farm by producers up to September was generally downward. Livestock, as a class, declined somewhat more than crops. Farm products as a whole were selling at 13% above the pre-war average during the month of August.

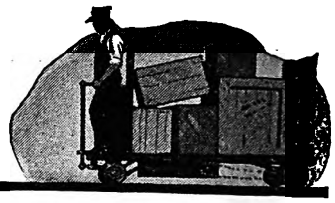
Movement of grain to market is fairly heavy, but has been somewhat impeded by lack of cars in certain sections. Heavy quantities of butter and cheese have moved into storage, but storage stocks of meat are abnormally low. The movement of hogs and cattle to market was much heavier in August of this year than last. Exports of wheat and cotton, on the other hand, were much lighter in August than in the same month last year.



This year's yield of the leading crops of the United States show all crops, except cotton, surpassing the 100% production average of five years.



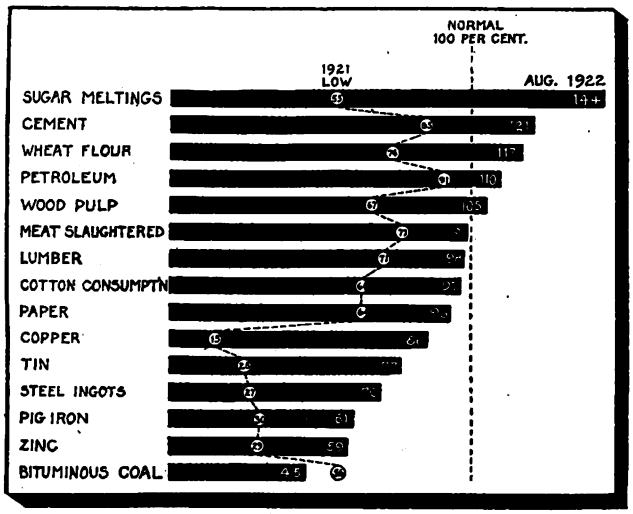
AT A GLANCE



Fuel, Power, Electricity

THE production of electricity by public-utility power plants in August again broke all previous records with an average daily production of 131,100,000 Kw. hrs., exceeding the record for June of 127,800,000 Kw. hrs. by about 2½% and the July rate by about 5%. As the output of electricity by waterpower is falling off, due to the usual seasonal decrease in the water supply, the increased demand for electric power was met by fuel-generated power.

A comparison of the relative amounts of the different fuels consumed in June and August shows that the proportion of oil and gas used by public-utility power plants in the production of electricity was about 15% greater in August



(Federal Reserve Bank, New York)

Production of basic commodities in August, 1922, and the low point in 1921 compared with normal production.

than in June. The scarcity of coal has increased the use of oil and gas.

Thousands of Kw. Hrs. Electric Power Produced by Fuels

	August, 1922	July, 1922	June, 1922
By waterpower	1,524,243	1,546,994	1,587,943
Total	2,538,852	2,314,300	2,247,487

Rubber

RECENT census reports show a decrease in the activities of establishments engaged in the manufacture of rubber boots and shoes during 1921 as compared with 1919. Twenty-four leading establishments reported products to the value of $93,625,659 in 1921, compared with $116,917,434 in 1919. The total number of boots and shoes produced in 1921 amounted to 102,031,650 pairs, as compared with 96,406,522 pairs in 1919.

Textiles

RECENT weather conditions have been propitious for both the picking and ginning of the cotton crop. Continued activity is reported in the dry-goods markets, with a better feeling for all lines. Price changes have been immaterial.

Regarding the cotton movement from August 1 to September 29, Northern spinners' takings totaled 236,010 bales in 1922, as compared with 296,661 bales in 1921, and Southern spinners' takings totaled 563,462 bales in 1922 and 667,123 bales in 1921.

A marked increase occurred in the activity of the cotton mills in August. Mill consumption of raw cotton for the month totaled 527,404 bales, an increase of nearly 69,000 bales over July and the largest consumption reported for any month in the last two years. Exports of cotton, on the other hand, were 100,000 bales less than in the preceding month, and at only 273,308 bales represented by far the lowest export for any month in two years. Mill stocks of cotton declined again in August, although there was a slight increase in warehouse holdings due to the early crop movement. The total stocks in both positions was 2,575,000 bales on August 31, 1922, compared to 2,703,000 bales a month before and 4,470,000 bales at the end of August last year.

Silk consumption, as measured by warehouse withdrawals, showed a marked increase in August. The total of 34,772 bales is the largest reported for any month on record. Stocks of raw silk also increased, amounting to 32,515 bales, which are the largest holdings since December, 1920.

Lumber

One hundred and twenty-eight mills reporting to the West Coast Lumberman's Association for the last week in September manufactured 90,855,948 feet of lumber, sold 75,442,933 feet, and shipped 73,832,602 feet. Production was 8% above normal; new business, 17% below production; shipments, 2% below new business.

Reports of Southern Pine Growers

	Weed ending Sept. 29	Week ending Sept 22	Week ending Sept. 1
No. of mills reporting	126	133	126
Aver. weekly prod., ft.	566,546	571,462	594,907
Normal aver. prod., ft.	678,844	677,440	672,736
Aver. shipments, ft.....	.....	444,575	577,846

Zinc

PRODUCTION of zinc during August of this year totaled 31,423 tons. Shipments during this month totaled 38,412 tons, and total stocks on hand, August 31, were 21,629 tons. The number of retorts operating at the end of the month were 57,193.

Petroleum

THE daily average crude oil production in the United States for the last week in September amounted to 1,509,050 barrels, as compared with 1,507,050 barrels for the preceding week.

The estimated daily average gross production of the Mid-Continent (light oil) field for the same week was 807,600 barrels, as compared with 807,450 barrels for the preceding week. The estimated daily average gross production of the Gulf Coast (heavy oil) field was 113,950 barrels, as compared with 113,350 barrels for the preceding week. Imports of petroleum at principal United States ports for the week ended September 30 amounted to 1,946,771 barrels (42 gallons), compared with 1,228,384 barrels for the week ended September 23.

During August a total of 8,538 oil and gas projecting permits were received by the Bureau of Mines, while 307 leases were received during the same time.



Basic Commodity Prices

(Minimum, at New York, unless otherwise specified)

	Week Ending Oct. 7	Week Ending Sept. 30	Year Ago
Aluminum, pig (ton lots), lb.	.17	.175	.17
Antimony, ordinary, lb.	.06	.06	.0525
Brick, Hudson R., per M.	18.00	18.00	15.00
Cement, Portland, bbl.	1.70	1.70	1.70
Copper, Electrolytic, lb.	.14	.14	.12857
Cotton, spot, Mid. Upl., lb.	...	...	...
Hides, Chic. Pack., No. 1, lb.	.2225	.22	.145
Lead, N. Y., lb.	.06625	.0665	.047
Petroleum, crude, at well, bbl.	3.00	3.00	2.75
Pig iron, Bessemer, Pgh., ton	35.77	35.77	21.96
Pine, roofers 6 in., M. ft.	34.50	34.50	27.50
Rubber, Up River, fine, lb.	.19	.185	.215
Silks, Sinshiu, No. 1, lb.	8.10	7.70	6.20
Spelter, N. Y., lb.	.0705	.072	.049
Steel Billets, Bess., Pgh., ton	40.00	40.00	29.00
Tin, N. Y., lb.	.3275	.325	.2725
Wool, Dom., ½ blood com., lb.	.50	.50	.29

Wholesale Commodity Prices

Coal—			
Bit., ¾ in., lump, net ton	...	...	...
Anthracite, egg, net ton	...	...	...
Coke, furnace, net ton	12.00	12.00	3.25
Cotton Goods—			
Brown Sheetings, Std. yd.	.1325	.1325	.135
Standard Prints, yd.	.105	.1025	.11
Print Cloths, 38½ in., 64x60, yd.	.09	.09	.0975
Drugs and Chemicals—			
Alcohol, ethyl, form 5, gal.	.36	.34	.40
Alcohol, wood, 95%, gal.	.69	.69	.65
Alum, lump, lb.	.035	.035	.035
Bleaching Powder, over 34%, 100 lbs.	2.00	2.00	2.25
Borax, crystal, in bbl., lb.	.06	.06	.055
Caustic Soda, 76%, 100 lbs.	3.45	3.55	4.00
Lime, factory, 200-lb. bbl.	1.90	1.90	1.90
Nitric Acid, 42°, lb.	.055	.0575	.0675
Saltpeter, crystal, 100 lbs.	.0775	.0775	.1075
Soda Ash, 58% light, 100 lbs.	1.75	1.75	2.10
Sulphuric Acid, 60%, 100 lbs.	.50	.50	.55
Flour—			
Spring Pat., 196 lbs.	6.50	6.50	7.50
Winter, soft str't, 100 lbs.	5.10	5.10	6.00
Grains—			
Wheat, No. 2 Red, bu.	1.275	1.21	1.225
Corn, No. 2 Yellow, bu.	.86	.83	.68
Oats, No. 3 White, bu.	.535	.485	.465
Rye, No. 2, bu.	.8725	.8425	.95
Barley, malting, bu.	.79	.79	.66
Hay, No. 1, 100 lbs.	1.25	1.20	1.50
Straw, lg., rye, No. 2, 100 lbs.	1.15	1.20	1.00
Hides—			
Cows, heavy native, lb.	.205	.205	.1325
Country, No. 1 steers, lb.	.14	.14	.08
Iron and Steel—			
Basic, Valley furnace, ton	33.50	34.00	19.25
Steel bars, Pittsburgh, 100 lbs.	2.00	2.00	1.60
Beams, Pittsburgh, 100 lbs.	2.00	2.00	1.60
Galvanized Sheets, No. 28, Pittsburgh, 100 lbs.	4.50	4.35	4.00
Leather—			
Scoured oak backs, No. 1, lb.	.55	.55	.54
Lumber—			
FAS Qtd. Wh. Oak, 4/4", M. ft.	145.00	145.00	135.00
Tonawanda Wh. Pine No. 1 barn 1x4", M. ft.	82.00	82.00	86.00
Adirondack Spruce, 2x4", M. ft.	38.00	38.00	40.00
No. 1 Com. Y. Pine Bds., 1x4", M. ft.	47.25	47.25	37.00
Oils—			
Coconut, spot N. Y., lb.	.085	.085	.10
Crude, tks, f.o.b., coast, lb.	.0675	.0675	.08125
China Wood, bbls., spot, lb.	.1275	.1275	.145
Cottonseed, lb.	.09	.095	.09
Linseed, city, raw, gal.	.93	.94	.73
Paraffine wax, ref., 125 m. p., lb.	.0325	.0325	.035
Turpentine, gal.	1.38	1.38	.755
Paints—			
White Lead, in oil, lb.	.105	.1275	.1225
White Lead, dry, lb.	.0775	.0775	.065
Zinc., Amer., lb.	.07	.07	.075
Paper			
News roll, 100 lbs.	4.00	4.00	4.75
Book SS. & C., lb.	...	...	.067
Wood Pulp, ton	...	...	80.00
Sugar—			
Cent. 96°, 100 lbs.	5.28	4.87	4.125
Fine Gran., in bbls., 100 lbs.	6.50	6.25	5.50
Wool—			
Boston Aver. 98 quot., lb.	.7261	.7225	.4102
Stand. Clay Wor., 16-oz., yd.	3.00	3.00	2.85
Fancy Cassimere, 13-oz., yd.	2.45	2.45	2.25
Serge, 36", Wor., yd.	.60	.60	.52
Broadcloth, 54", yd.	2.75	2.75	2.50
Cottonwarp serge, 36", yd.	.45	.45	.45

Financial

Bank Clearings	Week Ending Oct. 7	Week Ending Sept. 30	Year Ago
New York	$4,725,039,093	$4,050,456,051	$3,810,188,166
Chicago	641,211,419	543,939,908	529,346,818
Entire Country.	8,610,000,000	7,372,000,000	7,005,000,000
Increase or decr.	+22.9%	+4.7%	—17.1%
(Per cent of total from preceding year)			

Cost of Money—New York	Week End. Oct. 7	Week End. Sept. 30	Year to Date	Year Ago
Call Loans	5@4	5@4¼	6@2¾	5½@4½
Time Loans (60-90 days)	4¾	4¾@4½	5@3½	5½@5¼
Six Months	5@4¾	5@4¾	5@3¾	5¾@5¼
Com.Discounts,4-6mo.	4½@4¼	4½@4¼	5@4	6@5¾

Financial Transactions	Week Ending Oct. 7	Week Ending Sept. 30	Year Ago
Stock Sales, shares	5,866,509	4,853,286	2,877,719
Aver. Price, 25 Railroads	68.91 h. 66.67 l.	68.74 h. 65.90 l.	54.65 h. 54.14 l.
Aver. Price, 25 Industrials	110.55 h. 104.94 l.	106.87 h. 103.05 l.	76.11 h. 74.11 l.
Sales of Bonds, Par Value	$65,564,200	$83,287,030	$99,019,450
Aver. Price, 40 Bonds	82.05 h. 81.41 l.	82.20 h. 81.26 l.	71.62 h. 71.44 l.
Average Net Yield, 10 High-Grade Bonds	4.470%	4.479%	5.235%
New Security Issues	$60,072,000	$26,813,000	$9,500,000

Business Failures	Week End. Oct. 5	Week End. Sept. 28	Year Ago
Number	383	380	353
	Sept., 1922	August, 1922	Sept., 1921
Liabilities	$36,500,000	$40,279,718	$37,020,837
Number	1,560	1,714	1,466

Industrial

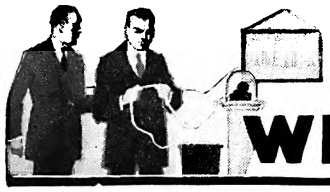
Building Permits	August, 1922	July, 1922	August, 1921
	$212,909,181*	$188,155,537†	$154,033,461*

*153 cities. †149 cities.

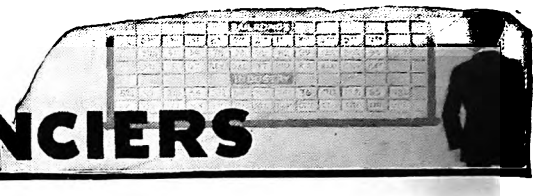
Idle Freight Cars	Sept. 15, 1922	Sept. 8 1922	Aug. 15, 1922
Number	168,683	188,882	308,270
Car Loadings	Sept. 23, 1922	Sept. 16, 1922	Aug. 26 1922
Number	973,291	945,919	890,838
Railroad Earnings	Week ending Sept. 30	Week ending Sept. 23	Year Ago
Gross	$15,679,366	$12,233,461	$14,361,643
Steel and Iron Barometer	Aug. 31, 1922	July 31, 1922	Aug. 31, 1921
U. S. Steel Orders (tons)	5,950,105	5,776,161	4,531,026
Daily Pig Iron Prod. (tons)	67,791*	58,586†	32,850*
Monthly Pig Iron Prod. (tons)	2,033,720*	1,816,170†	985,529*

*Month of September. †Month of August.

Foreign Trade	August, 1922	July, 1922	August, 1921
Exports	$302,000,000	$305,000,000	$366,887,538
Imports	271,000,000	251,000,000	194,768,751



WITH THE FINANCIERS



Securities Market Shows Bullish Tendencies

THE rise in stock prices which took place the first week in October is attributable to Kemal Pasha and the Rockefellers in the opinion of Merryle Stanley Rukeyser, writing in the *New York Tribune*. Kemal's contribution to the happiness of Wall Street was made during the Mudania Conference, which apparently stalled off the threatening European war. The Rockefellers did their little bit in the form of stock dividends of 100% and 200%, which were declared by the Standard Oil companies of California and New York.

What ever its cause, the rally enabled the financial markets to regain a large part of the ground they had lost during the sporadic reactions of the weeks immediately preceding. This decline was attributed by many newspaper writers to the political situation in the Far East, but a number of observers of the more "scientific" type said that the drop was due merely to the market's technical position. One of these observers, writing in a special investor's information service, explains this opinion thus:

"It should be noted that during the rise since August a year ago the only reaction of any importance occurred last June, but, since the low point of June, the 20 industrial stocks have advanced 10½ points on the average, and the 20 railroads 12½ points. This advance, in addition to the rise which had already taken place prior to June, created a temporarily overbought market, and it is reasonable to expect a technical correction in the market before any further upward rise takes place. The fact is that during every bull market there are technical reactions and sometimes they are of considerable proportion. For example, during the bull market of 1904 and '05 both the rails and the industrials reacted during the early summer of 1905 to the extent of 12 points on the average while during the bull market of 1908 and '09 there were two important reactions, each one approximating eight points on the average.

"We have received several inquiries recently asking whether this is the beginning of a bear market. Our reply to this is that the fundamental factors which forecast the course of the security market, still continue decidedly bullish. Therefore, the present reaction in the market cannot be considered fundamental but entirely technical in character.

"There is still some uncertainty regarding the immediate outlook of the security market. It is possible that the present reaction will go somewhat further, but the fundamental factors are strong."

Markets Rally When War Scare Subsides

THIS opinion of the fundamental factors appears to have been borne out by the rally which followed immediately upon the improvement in the tone of the news from the East. F. Schneider, Jr., writing in the *New York Evening Post,* has this to say of the latest down-and-up-again movement of the market:

"An apt illustration of the manner in which the movement of prices of itself influences sentiment is afforded by the markets of the past week. A natural reaction after a long and substantial advance was intensified by ringing the changes on the possibility of war in the Near East. Traders thereupon generally ignored the signs of improvement in industry, and a certain amount of panicky liquidation appeared. When this stage was reached and the reaction had about run its course it required only a slight change in the character of the foreign news to start the shorts to covering and to send prices up sharply to new high levels. Under these circumstances confidence returned and talk shifted to stocks dividends and huge surpluses."

Money Rates Not Likely to Increase Much

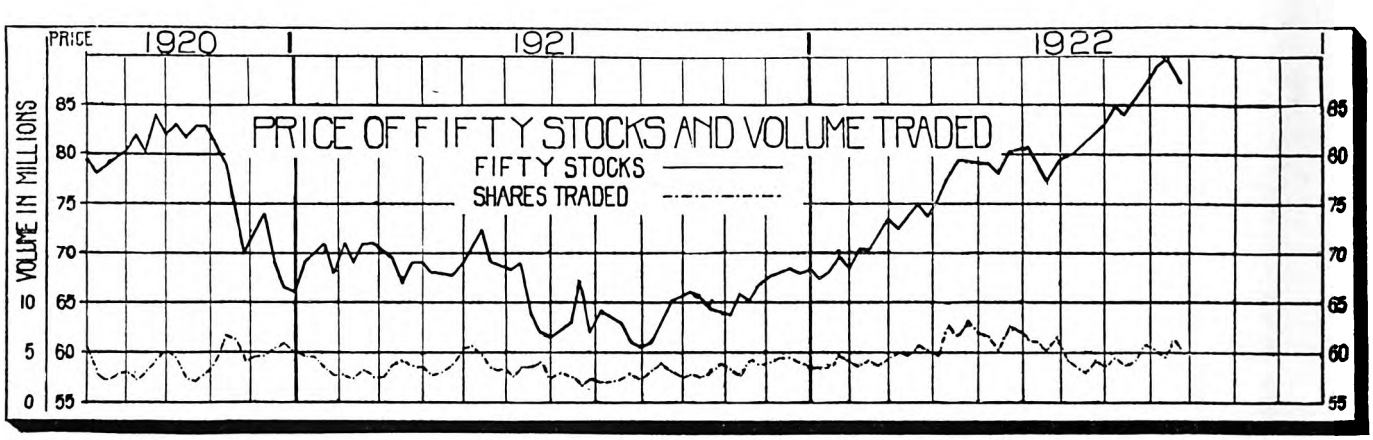
THE bond market, as well as the stock market, participated in the rally, in spite of the fact that money rates are firmer. The opinion persists that the tightening in money is temporary, and that a sharp increase in rates during the rest of the year is unlikely.

The *Brookmire Economic Service* analyzes the money situation as follows:

"It seems to us that the higher money rates noted are the direct result of the recent rush by importers who wished to get goods into the United States ahead of the date when the new tariff law became effective.

"The condition of the banks. whether we consider private banks or the Federal Reserve System itself, is such as to indicate that the present urgency is only a temporary one, which will be relieved as the excessive importations of goods move into ordinary mercantile channels. We forecast that short term money rates will not again in this cycle fall much lower, but neither do we see any reason in conditions now existing to expect any runaway upward movement of rates.

"Business is undoubtedly increasing throughout the country, and this will gradually increase the demand for loan accommodations, but the unloaned surplus of funds is sufficiently great to supply the demand at very reasonable rates for some months to come."



(United Business Service)

Prices of fifty stocks during the past 26 months and a record of the volume of trading.



Country-Wide Survey Shows Improvement

EMPLOYMENT is increasing in the United States. This is conclusively shown by the Department of Labor's industrial analysis for September, made public during the past fortnight.

There was an increase of 28,668 men on the payrolls of 1428 firms canvassed by the Department's agents. Increased employment is reflected in all but four of the major industrial groups. The industries with increased employment are as follows: Railroad repair shops; tobacco manufactures; textiles and their products; iron and steel and their products; food and kindred products; miscellaneous; leather and its finished products; lumber and its manufacture; paper and printing; chemicals and allied products. Decreased employment is disclosed in liquor and beverages; vehicles for land transportation; metal and metal products other than iron and steel and stone; clay and glass products.

Railroad repair shops reveal the most encouraging increases, adding 11,362 workers. The tobacco industry recovered and increased employment with 1837 workers; textiles, 11,858; iron and steel, 11,576; food and kindred products, 3932; miscellaneous, 4695; leather, 543; lumber 206; paper and printing, 188, and chemicals, 195. Seasonal conditions caused a drop of 16,232 workers in the vehicle industry. Metal and metal products, other than iron and steel, through inadequate transportation, suffered a decrease of 653 workers. Stone, clay and glass products released 98 employees and liquor and beverages 92, largely due to turnover.

Sixty-five leading cities reported increased employment in September over the previous months, and in 17 cities there was a slight decrease. Among the centers where employment is less are Birmingham, Toledo, Omaha, Detroit, New Orleans, Newark, Los Angeles, Perth Amboy, Cleveland, Seattle, St. Louis, Passaic and Dayton.

Industrial employment in all parts of the country has been accelerated by adjustment of the coal and railroad shop controversies, says the report. Inadequate car and fuel supply has retarded a further improvement. Iron and steel made strong increase in employment, car shortage alone impeding greater progress. Lumber, while showing increased employment, also suffered in this respect. Pittsburgh, Chicago, Memphis, Baltimore, Bridgeport, Conn., Johnstown, Pa., Buffalo, N. Y., and Youngstown, Ohio, are among the first steel centers to show improvement. Adjustment of textile labor controversy has increased employment in that industry tremendously. The improvement in the textile situation is shown in further increases in such centers as Lawrence, Lowell, Boston, Springfield, Mass., Paterson, N. J., Manchester, N. H., Providence, Worcester and Fall River.

Steadily increasing employment has been maintained for the past four months in Boston, Louisville, Ky., Paterson, N. J., Waterbury, Conn., Philadelphia, Worcester, Mass., Milwaukee, Jersey City, N. J., Richmond, Va., Cincinnati, Ohio, Reading, Pa., and Syracuse, N. Y.

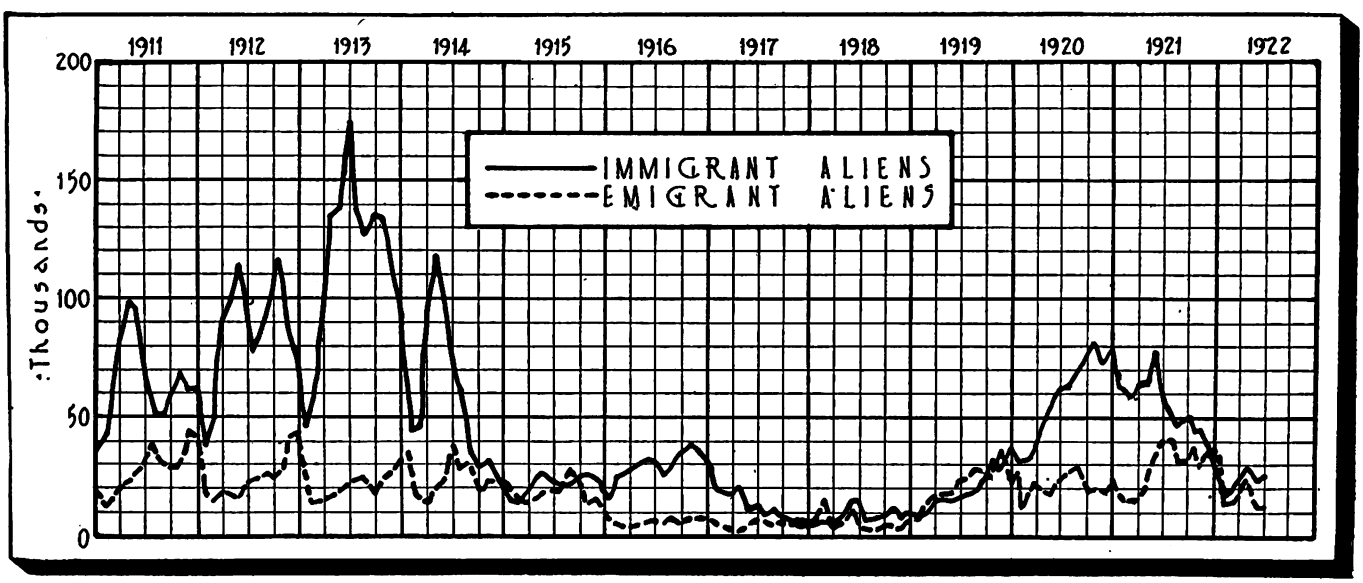
Building construction is maintaining a steady pace in practically all sections of the country. Shortages in building trades are apparent in Massachusetts, New York, New Jersey, Pennsylvania, Arizona and California, while a surplus is evident in Oklahoma. Mill workers and factory hands are in demand in New England, Middle Atlantic and Middle Western States. A surplus of granite workers still existent in New England.

The most encouraging sign of increased employment and prosperity is a threatened common labor shortage in all parts of the country. From all indications, the elimination of transportation and fuel difficulties will speed production and employment to a higher degree than has obtained since the war.

Wages Are Increasing

ADDITIONAL evidence of the upward trend of wages and employment is contained in a report of the New York State Industrial Commission, which declares that the average worker in New York State earned 33 cents more a week in August than in July. The average weekly earnings in August were $25.10. This is an increase of 85 cents since

(Turn to page 1725)



(Magazine of Wall Street)

The flow of immigration and emigration since 1911. Labor shortages will probably widen the gap between the two lines.



IN THE MANAGER'S OFFICE



How to Reduce Costs

WRITING in the *Bulletin of the Taylor Society,* Wallace Clark outlines a practical plan for reducing losses during a depression. In a period of declining or dull business, there are in every manufacturing plant certain expenditures which must go on, no matter how few orders there are. A skeleton organization must be kept in the shop—the superintendent, foreman, inspectors, truckmen, watchmen and so on. In addition, there are the interest on the investment on land, buildings and equipment, depreciation, taxes, insurance and repairs. All these expenses go on whether there is work or not; they are due to keeping the shop ready for work and are not increased or decreased by the acceptance of an order. It is clear, therefore, that these overhead expenses or losses will not be increased by the acceptance of an order at a price which does not cover any of this overhead. The expenses created by the acceptance of a specific order are cost of material, direct labor, power and fuel. It may be stated then that prices can be reduced without increasing losses to a point which covers the cost of material, direct labor, power and fuel, but which does not cover any part of the overhead. In other words, it is possible to sell below cost without increasing losses.

Knowing that he has nothing to lose until he reaches the material-labor-power-fuel cost, the manager begins to lower his quotations and keeps on until he gets the orders. When there is plenty of work ahead, prices should be quoted which will produce profits, but when there is little work to be had, prices should be quoted which will reduce losses. Losses must be eliminated before there can be any profits.

Standardizing Purchasing Departments

THE economies and benefits derived from a fixed policy of standardization have been very thoroughly demonstrated in the past few years. Wells R. Bill, in *The Purchasing Agent,* outlines some of the results of standardization in the purchasing department.

Quantity purchasing means economical purchasing, and standardization is essential to quantity purchasing because it permits of large scale production. The principles of standardization may be applied not only to equipment or appliances, but also to methods of operation. Standards may be set by the planning department, engineering department or a standardization committee. The purchasing agent, however, should act in an advisory capacity to these departments in setting standards.

One of the biggest factors in standardizing is the selection of an article or piece of equipment that is best adaptable for a particular work or service. It is essential to know how and for what purpose a given article is going to be used.

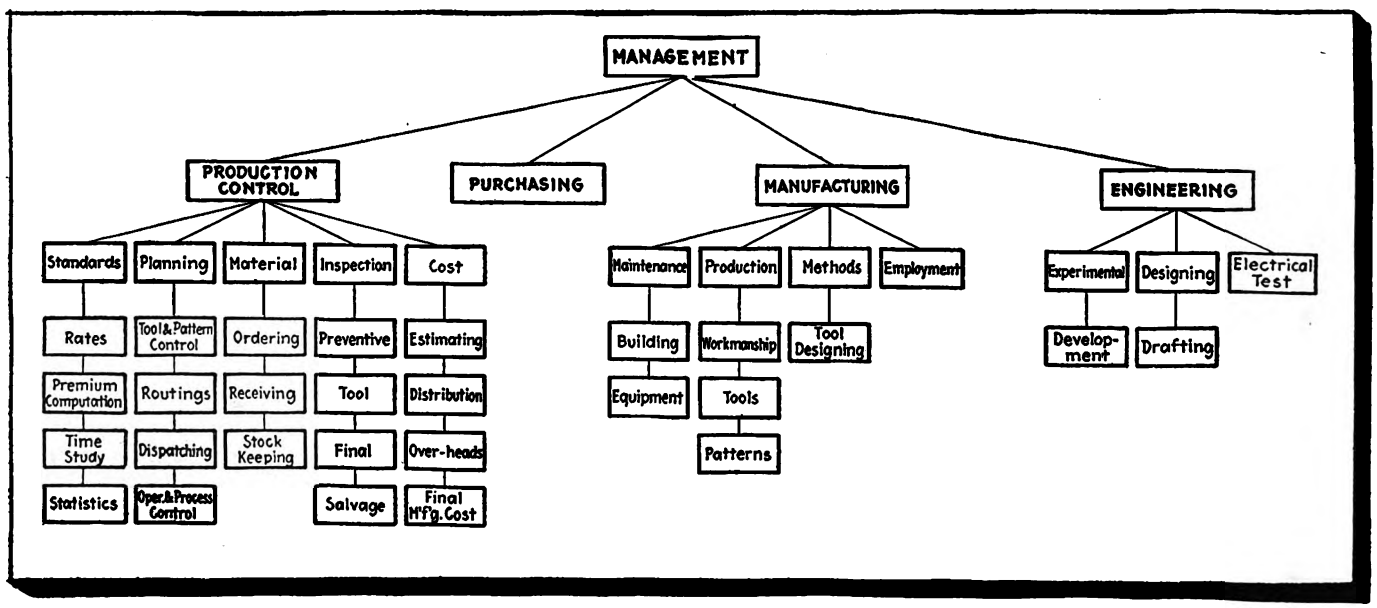
Forms and printed matter are good subjects for standardization. A form should be of a size that will cut to advantage or without waste from a standard sheet of paper. The quality of the paper is dependent on the proposed use.

Equipment should be standardized before attempting to standardize forms. Special price concessions may be obtained from many manufacturers by adopting or standardizing on one line of equipment. With the many standard makes of equipment on the market today, it is comparatively easy to select material on a standardized basis.

Accurate Cost Accounting

THE importance of accurate cost information in dull times is emphasized by William R. Basset in the *American Machinist.* A delusive cost system is much worse than none at all. Most home-made systems are delusive. They do not take enough factors into consideration.

The common method for getting at sales expense is to divide the total of merchandise by the total of sales expense. The figure thus obtained is supposed to be the percentage cost per dollar of sales. This is true only if all the goods are exactly alike, priced alike and sold under the same conditions. What really results is the loading of high-priced articles with such a volume of sales expense as to make their movement difficult and to relieve low-priced articles of so much sales expense that actually they are often sold at a loss.



(American Machinist)

Chart of a manufacturing organization involving many departments (Robbins & Myers Co.)

EMPLOYEES' RATING SHEET

DEPARTMENT_____ MONTH OF_____192__

PERSONNEL	QUALITY 25%					QUANTITY 25%					EXPERIENCE 25%			CO-OPERATION 25%			RATING
	Thoroughness and Accuracy	Neatness in Work and Appearance	Courtesy	Initiative	Mark Total Percentage of Quality	Indicate in proper column your estimate of Employees' ability to accomplish a proper amount of work, considering the conditions and duties of the month					Knowledge of duties, departmental routine and plant organization	Adaptability to Serve in Other Departments	Mark Total Percentage of Experience	Willingness	Reliability in Work and Attendance	Mark Total Percentage of Co-operation	Do not write in this column
	Maximum 10	Maximum 5	Maximum 5	Maximum 5		Maximum 25	Excellent 20	Good 15	Fair 10	Poor 5	Maximum 20	Maximum 5		Maximum 10	Maximum 15		

A practical form for factors by which to grade employees.

The subject of units of sale is one which deserves a great deal of attention from business men. The unit must be determined by the costs and when that unit is once determined, variations from it have to be sold at prices dictated by the

Sales costs are rarely accurate and manufacturing costs are in but little better condition. One of the many fallacious ways of estimating a manufacturing cost is to compare the labor and overhead with the cost of the material. This method can hardly give a figure that means anything because the value of the material is only a factor entering into the cost of the finished product. The value itself in no way determines the amount of work that has to be put on the material or the space it occupies.

Simplicity is the keynote of modern cost accounting. But the simplifications have to be scientific.

How to Grade Employees

THE results of the use of alertness tests for rating employees, discussed in a recent issue, agree very closely with arbitrary ratings made by supervisors and department heads. For those who prefer the method of executive ratings the form illustrated is given as a just basis for grading employees. With a few modifications, the chart represents the method used in a nationally known retail establishment.

All executives should work as nearly on the same basis as possible, so that the ratings for the entire organization can be averaged fairly. Some executives are low raters, believing that the best are not better than 60 or 70. Others are high raters, using 100 as signifying their best employees. If we stop to reason, we realize that many employees are not 100% in their job. On the other hand, the valuable employees in a department should certainly be rated over 70%. The best plan is to take an established figure and rate from that figure.

The factors listed under quality are self-explanatory. It is well to remember that in grading courtesy to customers, executives and fellow-workers, it is human nature for some to be more courteous than others. Initiative is the ability to work without supervision. It is practically impossible to attain a perfect score on this point. Only the employees who are above the average should be rated more than 2. Many employees can carry out instructions given them, but do not have the ability to work without supervision, nor to do what is to be done without being told to do it.

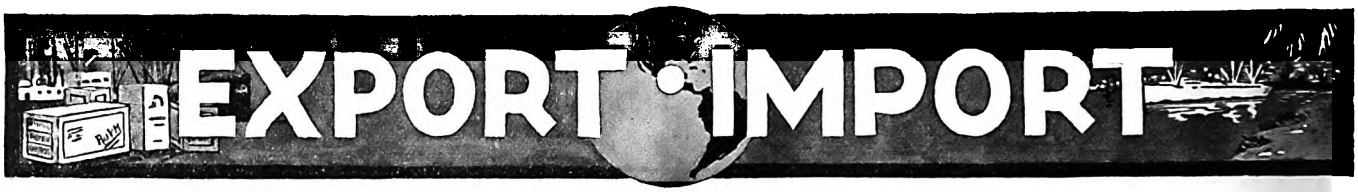
Under quantity, the quality of the work should not be confused with quantity. Often a good employee gives quality but is slower than some other, and when the rating is made, the two are apt to be rated equally.

Experience includes knowledge of the job routine and of specific job instructions.

Willingness (under cooperation) is the inclination to work well with others in the same department and to be pleasant and helpful to employees of other departments for the general benefit of the organization.

Reliability is epitomized as "being in the right place at the right time and doing the right thing." Some workers think nothing of absenting themselves without notification or of coming in five to ten minutes late day after day. One time late, or one day absent (within the rating period) without being excused, prevents an employee from receiving the maximum rating.

The whole idea of the figures and analysis given is to give executives who do the rating a set of figures for their guidance. Too high a rating is just as much an injustice in the end as one that is too low.



General Export and Import Conditions

THIRTY-FIVE large manufacturing concerns distributed throughout the United States have reported to the American Manufacturers Export Association that business abroad is picking up. Without exception, these firms declare that sales of American products abroad are increasing, and that the future will see greater improvement in the export trade.

A typical report is that of Joshua L. Baily & Co., cotton goods, who say:

"In the last six months our direct export business has been larger than at any time in our history. We are at the present time selling cotton piece goods even in Manchester, England, where they claim to make more cotton goods than, not only any other place in the world, but we understand they claim to make more cotton goods than any other country in the world; even the whole of the United States."

The Durham Duplex Razor Co. reports:

"Our export business has been picking up for some months past. In checking over our sales, we find that we have actually distributed during the first eight months of this year, through only one of our factories, more razors in countries than we sold in 12 months of any previous year, with the exception of 1919 and 1920."

The National Cash Register Company reports:

"This year our export business has shown a very marked increase over that of 1921. With the passing of the most acute period of the post-war readjustment, conditions in many parts of the world have improved to the extent of permitting an increase in our business."

Automotive

AUTOMOBILE manufacturers believe that the new tariff can be manipulated, under the elastic powers given to the President by the Fordney-McCumber Law, in such a way as to enable them to increase their exports materially. Proper adjustments of the American rates, they think will lead to adjustments of the restrictions placed by foreign countries on the importation of American cars. It should be possible to reduce to uniformity the various duties on automobiles which are now charged by industrial countries such as France, Belgium and Italy. A committee of the National Automobile Chamber of Commerce is arranging a conference with the Tariff Commission, and will ask for immediate action.

Cereals

THIS is not considered a favorable time for the promotion of sales of American grain in Europe. Two reasons are advanced by those who urged exporters to hold off: First, the new native grain is now available, and second, financial and economic conditions in Europe are much disturbed. During the winter, however, importations of American grain will be essential. A little later in the season, it is suggested, sales of American grain in Germany may be increased by means of more liberal credit arrangements, so that the grain can be shipped to the large, responsible milling associations, such as exist in the lower Rhine region, at a stipulated price in dollars, with payment deferred until the grain actually arrives and has been converted into flour. The importing millers could then make the bakers a price which would be sufficient to cover the cost of the grain and afford secure profits to themselves.

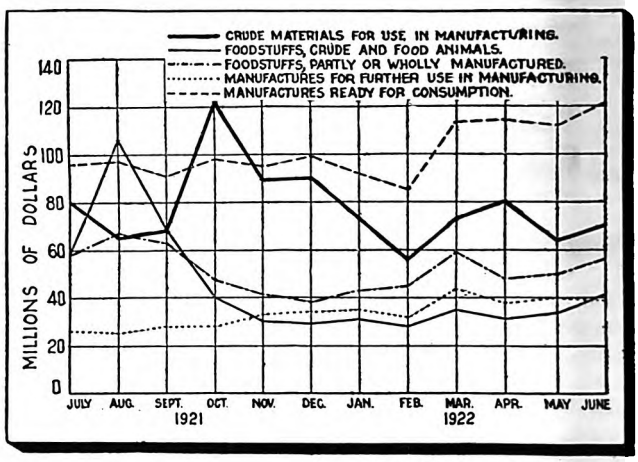
Chemicals

AMERICAN perfumes are permeating South America. Exports of perfumery, cosmetics, etc., to Argentina and Brazil have tripled since 1913. In the first seven months of 1922 these nations bought $183,693 worth of this sort of goods from us, compared with $209,908 in all of 1921 and $80,176 in 1913. The possibilities of this market are increased by the fact that in South America men as well as women use perfumes and cosmetics.

Electrical

THE Far East apparently is an excellent market for electrical materials. According to a report of the United States Consul at Mukden, Manchuria imported $1,877,267 worth of electrical goods in 1921. Most of the imports were through the port of Darien and were for the South Manchuria Railway. The imports were divided as follows:

Cables, wire and cord, $404,633; turbines, etc., $338,010; lamps and lampware, $207,441; motors and parts, $180,323;



(U. S. Commerce Reports)

Exports by great groups (fiscal year 1921-1922).

transformers, $164,239; batteries and dry cells, $73,235; switches, $41,691; insulators and porcelain cleats, $31,030; miscellaneous goods, $436,665.

Leather

THE total value of leather exports from the United States in August were valued at $3,573,318. On a quantity basis the August exports were 68% of the average monthly shipments in the last three pre-war years. Exports of upper leathers on a whole showed a slight increase, except in the case of side upper, including finished splits (not patent), calf and kip upper (not patent) sheep and lamb (not patent) and patent calf. Shipments of all classes of sole leather except chrome declined as compared with the previous month Glove leathers decreased about 30%. All other classes except harness and saddle leather, and rough tanned leather, including goatskins and kips showed rather marked decreases.

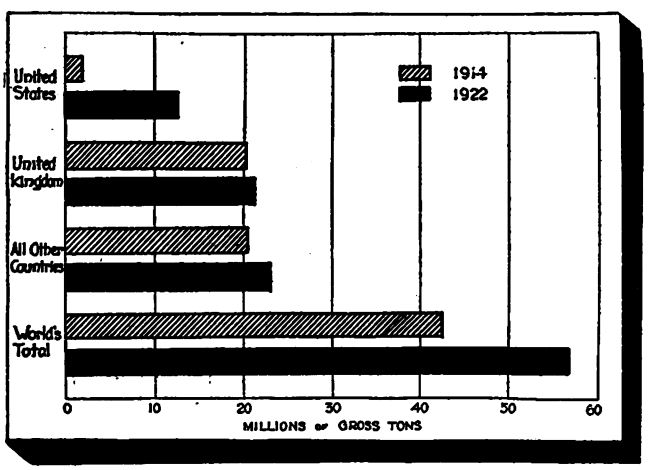
Lumber

THE best outlet in Italy for American lumber at the present time is for railway car construction and Southern pine is preferred as the material for this purpose. Consular advices state that approximately 2000 passenger cars of the

Italian railways will have to be replaced, while the plan also provides for the construction of 6000 additional freight cars. Southern yellow pine is preferred for framing, siding and ceiling of freight cars, and is also used extensively in the construction of second and third class passenger cars. In spite of the higher cost, Italian lumber dealers anticipate that their Government will continue to purchase Southern yellow pine for car construction.

Paper

OUR imports of paper have increased considerably since the war, according to figures compiled by Dr. Hugh P. Baker, Secretary of the American Paper and Pulp Association. Between 1913 and 1921 the value of the paper brought into this country increased from $24,359,827 to $92,462,472, and the value of the wood pulp imported grew from $21,174,217 to $49,494,822. During the first seven months of 1922, according to the Bureau of Foreign and Domestic Commerce, our imports of paper amounted to $48,739,478, and those of pulp totaled $30,663,077.



(Federal Reserve Bank, Phila.)

Tonnage of sea-going steel and iron steamers. Most of the increase which has occurred in the world's shipping tonnage since 1914 has been in the United States.

Rubber

RUMANIA must import virtually all her rubber goods, and therefore is a good potential market for the United States, according to Vice-Consul Heath, Bucharest, in a report to the Department of Commerce. In 1913 the United States exported only $15,450 worth of rubber goods to Rumania. Such exports in 1919, however, totaled $105,488, and in 1920, $669,042, and in 1921, $65,899. In the last six months of 1921 and during the present year imports of American goods have slumped greatly, and the slump still continues. This is due to a further pronounced decrease in the buying power of Rumanian currency, the revival of German competition, and the more aggressive attitude and advantageous exchange rate of other competing European nations. It is believed that this handicap can be overcome if Americans are disposed to imitate certain selling practices of their competitors, notably that of stocking goods in Rumania and selling them from a central agency or warehouse.

Textiles

SOME interesting information about the business of importing silk garments is contained in a recent publication of the United States Treasury Department, entitled "Imported Merchandise and Retail Prices." The Treasury Department reports that lace-trimmed silk undergarments are being imported from Belgium at a total cost, in New York after all charges such as transportation, insurance and import duties have been paid, of $21.69, and the same articles are being sold at retail for $60.00. Silk chenille veiling from France, according to the report, sells in the retail stores for 50 cents a yard, 170% more than the landed cost. Other silk articles are sold at increases of 150 to 225%. The Silk Association of America, an organization of manufacturers, contends that these figures show conclusively the need for a high protective tariff against the importation of such articles.

Domestic Exports of Cotton and Cotton Cloths

	Aug., 1922	Aug., 1921	8 mos., 1922
Raw cotton, including linters, bales.....	272,808	423,491	3,480,569
Raw cotton, including linters, value.....	$31,166,035	$25,886,197	$347,576,005
Total cotton cloths, sq. yds.....	50,068,152	56,369,371	397,397,139
Total cotton cloths, value.....	$7,144,961	$5,822,529	$55,967,840

That Flexible Clause

The Opponents of the Provision Permitting the President to Change Tariff Rates May Test Its Constitutionality in the Supreme Court

RECENT reports in import circles are to the effect that plans are under consideration for testing the constitutionality of that clause in the new law making it possible for the President to change the rates from time to time without the action of Congress. While it is conceded that this provision affords importers opportunity to apply to the tariff commission for decreases in the present rates, it is taken for granted that, under the present Administration at least, domestic manufacturers will be the greatest beneficiaries of the privileges offered.

In this connection, it is not unlikely, according to the *New York Commercial*, that a court contest soon will be begun and may reach the Supreme Court. Opponents of the clause, numbering many prominent firms in New York, will contend that the provision is unconstitutional in that the levy of duties by tariff taxation is solely placed within the power of Congress by the Constitution and that Congress cannot delegate this power to the President or to a tariff commission.

Customs experts predict that important developments in this direction will be forthcoming shortly.

Production Increase Widespread

Increased Demands for Manufactured Products in Nearly All Lines Help Restore Industry to a Sound Basis

FIGURES from industrial associations covering the month of August continue to show widespread increase in the production of commodities. In a great majority of cases the August production was the highest in many months and often the best record since the depression at the end of 1920. Moreover, this record was accomplished in the most critical month of the coal and railroad strikes.

The encouraging feature of the present industrial situation is the breadth of the increased activity. Factory employment, where reported, also appears to be the highest since the end of 1920, a factor that should result in a more even distribution of buying power.

Prices of agricultural products have declined, while minerals and manufactured articles have shown a tendency to rise. The bountiful harvests expected this year have tended to depress agricultural prices, while the increased demand for manufactured products, after two years of curtailed production and deliveries from stocks on hand, has put industry on a sound basis.



Novelties to Make Prospects Talk

THE value of the souvenir—the little advertising gift—in getting people to talk about a product is discussed by Charles Errett, president of the Lily Cup Co., in an article in *Novelty News*. Mr. Errett points out that the great aim of all advertising and publicity is to get yourself or your product talked about. People go to a show, or buy a car, not because they have seen it advertised in the newspapers, but because their friends have said it was good.

One of the best ways in which to make people talk about you, Mr. Errett thinks, is to distribute little novelties that can be used—

"Next to advertising in newspapers, advertising through specialties and by direct appeal is by far the weightiest branch of the publicity tree.

"It is my notion of all advertising novelties, specialties and souvenirs, that they are all little gifts or emblems of goodwill. They stand for a proper sincerity of service. They themselves should not be made the media solely for advertisements, at least, not to the extent that they defeat their purpose of evidencing friendship. Instead, they should be signs of friendly interest, a means of disarming suspicion, and establishing friendly relations.

"It is in this way that I have been successful in using a large variety of souvenirs provided me by different members of your very friendly association. Little pear-shaped leather purses with the customer's change snapped in have brought smiles to many friendly faces. Wallets with the sign of Lily Cups gold-stamped have been entrusted with money rolls. I have seen thousands of my black and white pencils poking out of vest pockets. The vice-president of a great railroad has begged in a letter for a Lily Cup telephone index. Little address books and memorandum cases have crossed continents in my service. Beaches have been dotted with big Lily Cup umbrellas. Each of these has carried an intensive and intimate message—valuable out of all proportion in the actual money cost.

"Say It by Phonograph"

THE Tide Water Oil Co. is using phonograph records to help sell lubricating oil. It found difficulty in introducing a new product—Fordol, for lubricating Ford cars only—to its dealers, and adopted an unusual method of putting the new oil across. The scheme is described as follows by C. B. Larrabee in *Printers' Ink*—

"On August 15 the company sent to all its salesmen a letter which began, 'Here's a proposition for you. By Sep-Fordol 10 send us the names and address of your 25 best Fordol dealer prospects. On September 10 we will mail these dealers a phonograph record of the Fordol story.'

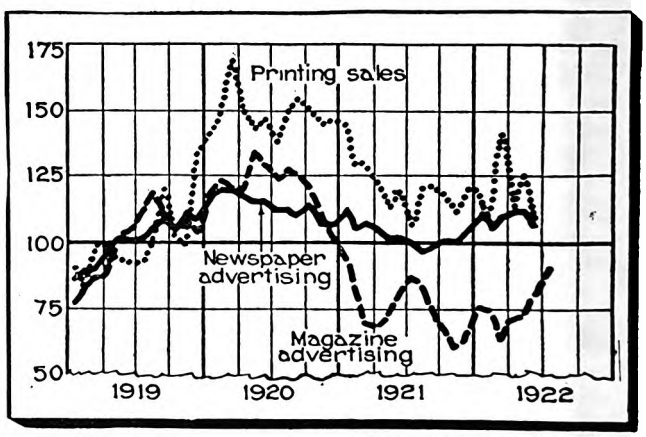
"The letter then explained the record plan in more detail and closed with another appeal for the dealer list.

"In this letter the company said in effect, 'Now is your chance to get to those fellows you've always wanted to get, the fellows who ought to carry Fordol but who don't. Don't send in the names of just 25 dealers. We want the names of the 25 biggest dealers in your territory who are not carrying our products. We want to help you sell them. We are limiting you to 25 because this is a special service—and we know that if you can send the names of only 25 dealers we will not be wasting any ammunition on dealers who don't count.'

"The salesmen responded enthusiastically, and the company was soon in possession of an unbeatable list of prospects, containing the names of the best dealers all over the country."

The company sent a phonograph record to each dealer on this list. Since there are more phonographs than automobiles in the United States, the Tide Water officials figured that every prospect would have a machine on which to play his new acquisition.

"Few dealers will throw the record away," Mr. Larrabee continues. "They will give it at least one hearing; curiosity takes care of that. Now there enters another factor. During the day the average dealer is apt to be approached by several salesmen. To each one he can give only a little time, and often that time is taken from other business. His attention is not concentrated, because he has the conduct of his business on his mind. But the phonograph record is stuck in his pocket and taken to his home. There he has no outside disturbances. He isn't thinking about the office, and so the record gets his undivided attention.



(Harvard Economic Service)

The volume of advertising and printing sales—1919 monthly average = 100%. Figures for newspaper and magazine advertising are adjusted for seasonal variation; those for printing sales are unadjusted.

"The record itself has an orange and black label, orange and black being the company's colors used on all its display material and on Veedol cans. And nowhere does it tell by whom it is issued. To the last the company prefers to keep up its 'teaser' campaign.

"One side of the record is called 'The Song of the Road,' and when the dealer plays it he hears a parody on a well-known song in which Veedol Fordol is played up as the big thing for 1923. The song is catchy, the words easy to remember, and if the record is played more than once or twice it will work its way into the dealer's consciousness unforgetably.

"The other side of the record is called, 'Carry Me Under Your Bonnet,' and is a short sales talk on Veedol Fordol. It lists briefly the eight economies of Fordol and ends up with a sentence which serves to win an introduction for the salesman. 'In a few days,' it says, 'a salesman will visit you to talk about Fordol. Give him ten minutes of your time, five minutes while he explains his proposition and five minutes while he takes you for a ride and demonstrates Fordol.'

"Two or three days later the salesman appears—and the chances are ten to one that he gets his hearing."

A Trademark with a Story

A GOOD trademark is so rare and so valuable a thing that when a manufacturer finds one for his product he usually loses no time in applying it. Yet a firm of collar manufacturers of Troy, N. Y., got an idea for a good trademark 40 years ago, cleared the way for its use immediately, but did not start to use it until 1922.

Almost 40 years ago, according to *Class,* Mark Twain wrote a letter to Miller & Bingham, collar makers, giving them permission to use his name as a brand. Within the past year Hall, Hartwell & Co., successors to Miller & Bingham, gave the name "Mark Twain" to a new line of collars of the semi-soft type.

"While it may seem strange," says *Class,* "that a manufacturer with the privilege of putting 'Mark Twain' on his product would wait for nearly twoscore years before doing this, a consideration of the author's attitude toward clothes in general and collars and shirts in particular will show how this happened.

"Mr. Twain did not care for starched, stiff collars, nor for shirts of the ordinary kind. He wore soft shirts and collars, the latter not detachable, and went in for comfortable dress calculated 'to save much profanity,' as he said in a letter to Miller & Bingham.

"The present vogue for soft collars has given a splendid opportunity to use the name and personality of Mark Twain in promoting the sale of the line, and clever use has been made of all of the rich advertising material which has been available.

"When the new collars were first marketed, Hall, Hartwell & Co. ran double-page spreads in the trade publications, not only describing the new product in detail, but reproducing the letter of Mark Twain, the original of which hangs in a frame on the walls of their office.

"The letter is as follows:

"'No, I am far from objecting to the compliment of the proposed bestowal of my name upon a new style of collar, for I think it is time the name should be connected with something useful—it has been confined to the esthetic and ornamental long enough.

"'Neither do I object to collars—as collars—though I never wear one—at least of the detachable sort.

"'I will explain that the shirt I wear is not a patented article, but I invented it myself, for the public benefit of lazy men. It and its collar open in the back, and the collar and the cuffs are not detachable. No buttons anywhere about it, except a couple at the back of the neck. This saves much profanity.'"

Trademark! Top or Bottom Display?

IN a recent issue of *Printers' Ink,* W. Livingston Larned calls attention to the fact that the advertising of the Heinz Company is upsetting a few traditions in the practice of name-plate display. Half-page sizes carry the name Heinz, all caps, at the very top, with a repetition in smaller size elsewhere in the advertisement and the well-known "57" as the concluding feature. Although in the majority of cases the name display is held to the bottom position, there are advocates of the idea that the name of the maker or the product should be made the equivalent of the sign on a store—on the principle that the advertising space is a retail shop, and the hanging out of a shingle is the logical thing to do.

The teasing, curiosity-arousing headline, given top position, has its advantages, but it is equally true that a trade name that is a household word should come in for its fair share of prominence. There are many sound business arguments in favor of placing the name at the top, making it more important than the picture or package or the story of the particular piece of copy.

When Consumer Advertising Reaches Peak

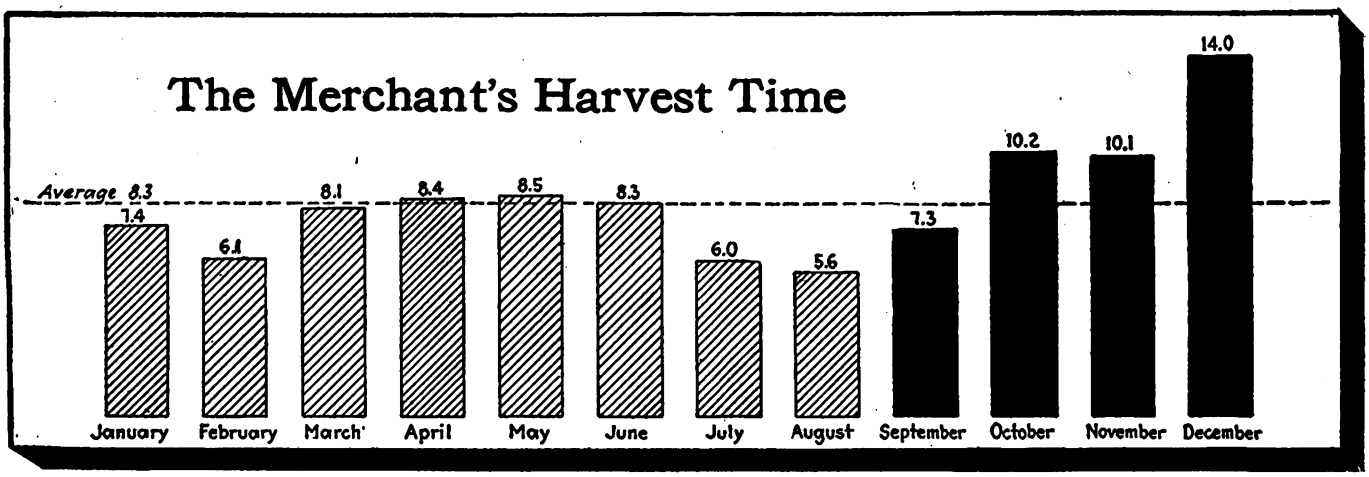
RIGHT now is the merchant's harvest time. The Federal Reserve Board made an investigation recently to see which months of the year are the best for retail selling, and discovered that during October, November and December, the period we are now entering upon, more sales are made than at any other time of the year.

The accompanying chart shows how trade fluctuates from month to month. June is an average month, and March is about on the same level. April and May are slightly above the average—probably because people then make their purchases for the Spring season. January is not so active, and February, July and August are quite inactive. The worst of them all is August, when the sun raises blisters on the asphalt and everyone who possibly can goes away on his vacation.

Beginning with September, trade starts to get active again. The first month of the fall is only slightly better than February, and not quite as good as January. With October the real rush to buy begins.

Electrical Merchandising takes this chart as the text of a sermon intended to instill pep into its readers. Now is the time for the merchant to get busy, this paper says. It is his real harvest-tide.

"Focus your cerebellum on the four black columns in the diagram," says the editor to his readers. "What more inspiration do you need? All the big business of the year is right ahead of you. Put your heart and head into it and show some extra speed, and all the richest profits of the year can be gathered within the next few months."



The black bars above show when retail selling and advertising is heaviest.

AUTOMOTIVE

South Offers Best Automobile Market

ALTHOUGH the demand for automobiles has shown a slight decline in the cities, there has been a perceptible swing upward in the agricultural districts. This interest is most in evidence at the State fairs now in progress in many sections of the country and forms a good barometer of what the industry may expect during the coming months.

Automotive Industries believes that the danger of secondary inflation may be avoided if the automobile manufacturer is not misled by the present buoyancy of the industry into thinking that it is not subject to the same economic laws as are other lines. He should not be hurried into extensions of production which are not justified by the circumstances and are due to confining his examination to the comparative condition of this industry during the last two years.

In discussing possible markets this publication points out that the prospective prosperity in the South makes for a good automotive market. No section of the country, according to this paper, can point to a greater improvement in morale in the past year than the South. In addition to the immediate prospects for sales, the cultivation of this market on a long swing basis is considered important.

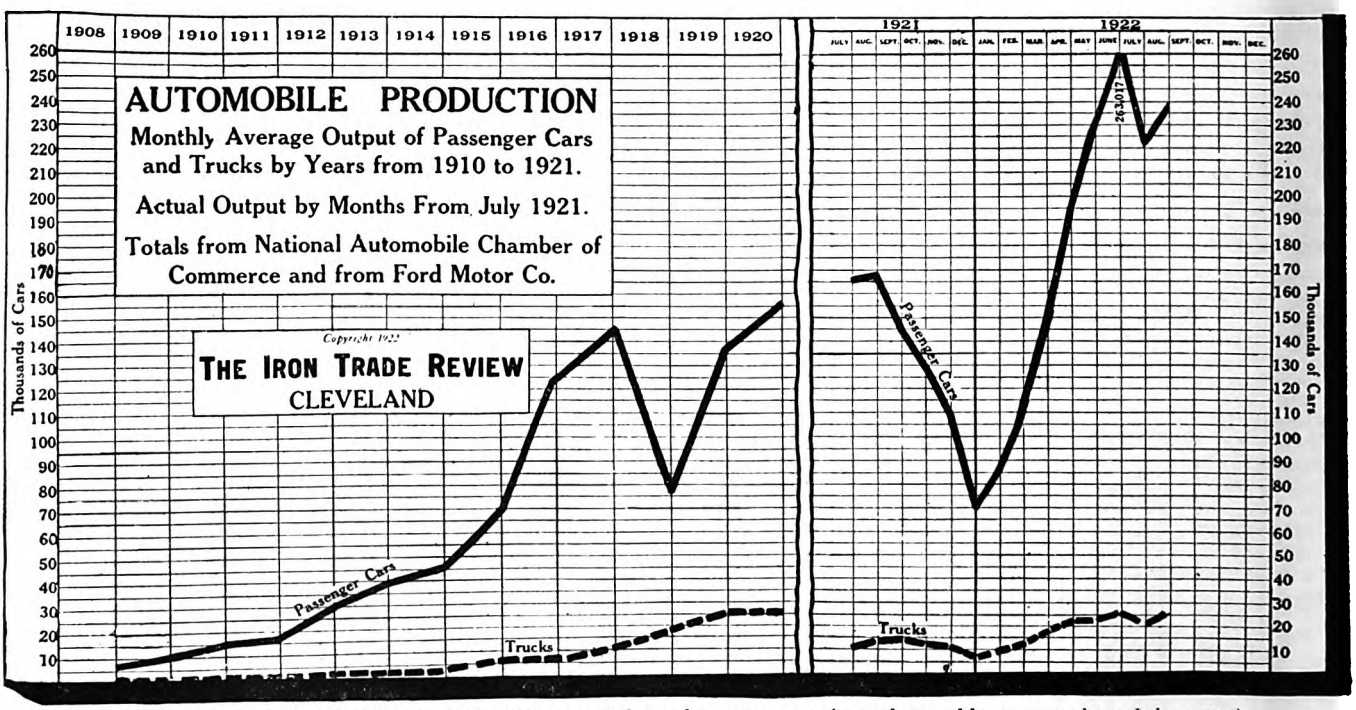
The chief difference between the South and other sections is that longer credits are asked, but even this difference is not nearly so marked as it was several years ago.

Can We Afford the Ford? The average Ford touring car, driven under average conditions, gives not more than 17.5 miles per gallon. Compared with other cars it should give 24 miles per gallon. One cause for this inefficiency is the present carbureting system, which can be so improved that the average Ford, driven under average conditions, will give 25 miles per gallon and operate as economically as more expensive cars. If this one improvement were applied to all the Ford cars in this country, 400,000,000 gallons of gasoline would be saved annually. G. G. BROWN, *J. Ind. Eng. Chem.*, 10-22, 1200 w. CJW.

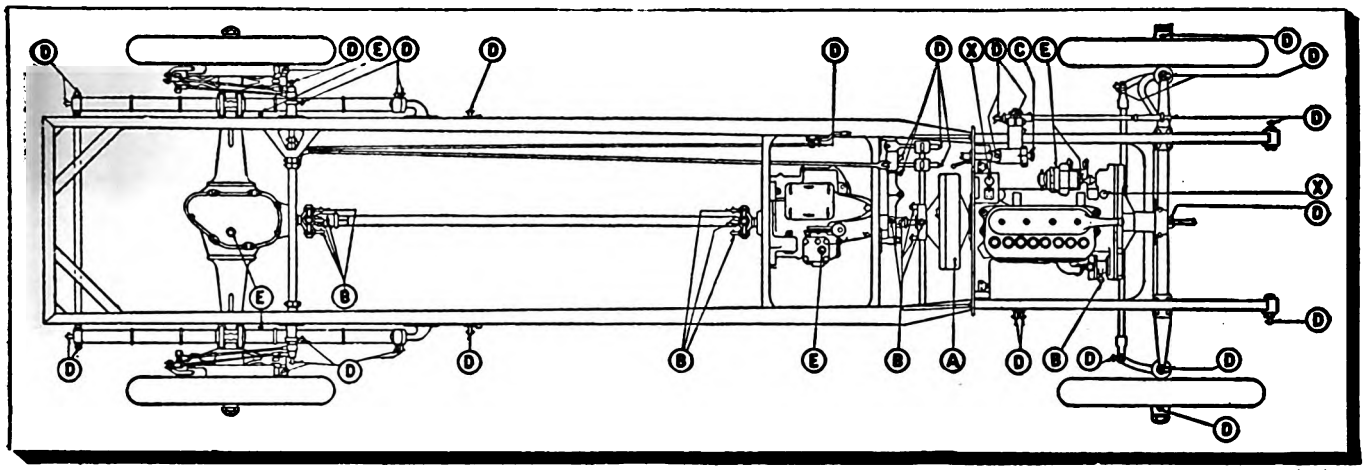
Comments on Motor Bus Design. This article by the general manager of the Fifth Avenue Coach Company, New York, itself a very large if not the largest American bus user, is just what its name indicates, a series of comments on various features of motor bus design and construction from an operator's and user's standpoint rather than from the viewpoint of theoretical design. He starts by saying that the controlling design factors are, in order of importance, safety, comfort and convenience of the public and minimum operating cost. Among the subjects prominent in his discussion under the item of safety features are low center of gravity, wide frame track and spring centers, effective brakes, and short turning radius. Each of these and many other topics are discussed in considerable detail. GEORGE A. GREEN, *Power Wagon*, 8-22, 7500 w. MAH.

Automotive Service Methods and Equipment. Describes some of the methods of the Yellow Car Co., Chicago. This instalment takes up particularly the welding of broken valve seats, repairing of scored cylinders, welding crankcases and other parts, reboring crankcase bearings in the lathe, remachining built-up transmission cases, salvaging shafts and other parts, and other similar repair work and the methods by which it is done. HOWARD CAMPBELL, *American Machinist*, 7-6-22, 1450 w. MAH.

Automotive Service Methods and Equipment. Many owners of large fleets have found it necessary or desirable to do all their own repair work. The Sinclair Refining Co., Chicago, is one of these. This article describes the work being done, and the methods and tools employed in this concern's shop. It includes boring crankcase main bearings, boring large end of connecting rods, turning crankshaft pins, lapping cylinder bores, brazing cracked manifolds, running in engines, etc. HOWARD CAMPBELL, *American Machinist*, 7-20-22, 1600 w. MAH.



Monthly average production of passenger cars and trucks, 1909-1922 (actual monthly output since July, 1921).



(Bus Transportation)

Lubrication for Buses. This diagram applies to most chassis, and shows 59 places requiring lubrication; in this number joints and clevices are not included. Following is a time schedule, which is recommended for proper lubrication. Oiling diagram indicating parts that require particular attention. Key to letters: (A) oil daily; (B) grease daily; (C) oil weekly; (D) grease weekly; (E) oil monthly.

Can Trucks Be Greatly Improved? This eminent British automotive manufacturer tells all about the changes in motor trucks of recent years, describes their present status, and winds up by answering his own question in the negative. His idea is that all the changes of the near future will be in matters of small detailed improvements. SIR JOHN E. THORNYCROFT, *Power Wagon,* 8-22, 2100 w. MAH.

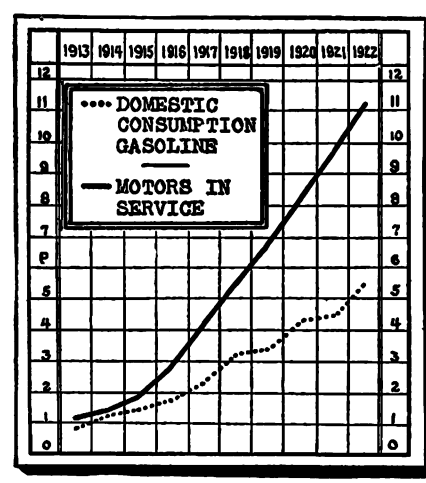
Field for Multiple Speed Transmission. This is mainly a description of a special four-speed transmission of the auxiliary type, designed to be added to a Ford truck in such a way as to permit the use of the usual Ford high and low speeds, plus the four speeds of the transmission added. In this way, six speeds are produced, one an emergency low speed which is lower than the Ford low, two intermediates, and an overgeared high speed, which is higher than the usual Ford high. By dividing the whole speed range into six sections, each to be used when most advantageous, instead of the restricted two divisions of the usual Ford planetary transmission, the author claims decreased consumption of fuel and oil, greater road speed with decreased motor speed, absence of vibration, elimination of wear on low speed bands, less fatigue from driving, and other advantages. GUY MORGAN, *Ford Car Trade Journal,* 9-22, 1800 w. MAH.

Air Flow in Relation to Water Cooling. The general idea of this article is that while radiator design is well advanced, the factors which control effectiveness are either disregarded or not well understood. The author proves the various points made by comparing all the usual types of radiator construction. A. LUDLOW CLAYDEN, *Automotive Industries,* 9-7-22, 4250 w. MAH.

Advantages and Limitations of Cold Drawn Steel in Automotive Work. Cold drawn work produces an excellent finish and the operations necessary to produce it are simple and fool proof. This gives it a considerable field, but one which might be broadened. Research is necessary to advance it much further for need of ductility in automobile metal necessitates use of soft steel. DR. WALTER ROSENHAIN, *Automotive Industries,* 9-7-22, 3700 w. MAH.

Grinding in the Automotive Industry. One of a series of articles in which the importance of the grinding machine in the manufacture of automotive parts is stressed. This one takes up the grinding of steel balls and ball bearing races; also roller bearing cups, cones and races. The balls are oil ground to a final finish, this being the last of several operations in the case of very accurate balls of a fine finish. The machines are shown on various parts of the work described, and shown in such a way as to illustrate the various fixtures and extra equipment which is special to bearing manufacture. *Machinery,* 8-22, 4800 w. MAH.

Machining Operations on Pneumatic Tools. The second part of this article, the first of which was mentioned in these columns previously. This one takes up turning and drilling crankshafts for air motors, machining valves, fixture for rolling segment stock, and other operations in the machining and assembling work. HOWARD CAMPBELL, *American Machinist,* 7-20-22, 1700 w. MAH.



(Financial World)

The increase in the domestic consumption of gasoline compared with the increase of motors in service, 1913-1922.

Effect of Highways on Motor Transport Economy. The cost of transport affects the condition of every country and the cost of almost every article produced and consumed in it. Bad roads add to the cost of transport and are a burden on the owners of vehicles, though they do not always realize the difference in the cost of operation, maintenance and repair of their vehicles when used over good and bad roads respectively. These two opening sentences of this article by Kord Montagu of Beaulieu give a good idea of the whole article as the entire argument, which is sound and perhaps conservative in the extreme, is built around the thoughts expressed therein, namely that good roads lower the cost of living and make for lower vehicle operating costs as well, or inverted, bad roads increase the cost of living and make for higher vehicle operating costs. *Power Wagon,* 8-22, 1600 w. MAH.

Preventing Highway Destruction. This State Commissioner takes the stand that the great cost of modern road building should not be wasted away by permitting any and all kinds of traffic upon the roads but rather through the careful supervision and restriction of this traffic. He suggests that this can be done by restricting all truck owners to the load upon which they are willing to pay a tax. That is, when a truck owner declares that his is a 2-ton truck and pays a tax according to this comparatively small load, he should be restricted to that load and fined when he carries more. He would place further restrictions on the width of tires or rather the unit load per inch of width making this so low that cutting action due to high unit loading would be prevented, also restricting the total gross load of any vehicle to 10 tons, 5 for the vehicle itself and 5 for its maximum load, ruling off the highways all vehicles of greater total weight as likely to cut the road surface. Other advanced road ideas, all of a preventative nature, are advanced. JOHN H. MACKALL, *Power Wagon,* 8-22, 2200 w. MAH.

Related Articles

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Comparative usage of connected capacities of electric trucks and household appliances 1705
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BUILDING·CONSTRUCTION

Cost of Building Still High

THERE is little prospect of lower building costs for the next eighteen months, according to *Building Topics*. Since March of this year material costs has been increasing. The March index figure of the United States Department of Labor is 155, referred to the average of the year 1913 as 100. In April, the index rose to 156; May, 160; June, 167; July, 170. This makes a 15-point rise since March. While the primary reason for this increase has been the demand brought about by the large volume of building which always accompanies an upward swing in the business cycle, a secondary cause has been the coal strike. Brick and steel, and every other building material dependent upon coal in manufacturing, have been raised very considerably over the figures that would have obtained if the miners had been at work since last April.

Moreover, wages in the building trades have stiffened where not fixed by definite agreement with the unions. Where such agreements are observed, a number of new schedules have been made, or are pending, which will raise the current hourly rates. Although the efficiency of building trades labor improved between the spring of 1920 and last winter, a slackening in morale and a lessening of efficiency is noticeable at present as the result of the demand for skilled labor which now exists. Therefore, since the first two elements of construction costs are increasing, and the third element, that of efficiency, is deteriorating, building costs are likely to remain high for some time to come.

Primitive Building Materials. Illustrated article showing how France and Germany are rebuilding devastated regions with materials used in the Middle Ages. The usual form is to erect a framework of wood and tamp into it a mixture of clay, gravel and straw, covering both faces with plaster. Buildings of this material have been in use for two or more centuries in Europe. *American Architect*, 8-30-22, 1000 w. EMcC.

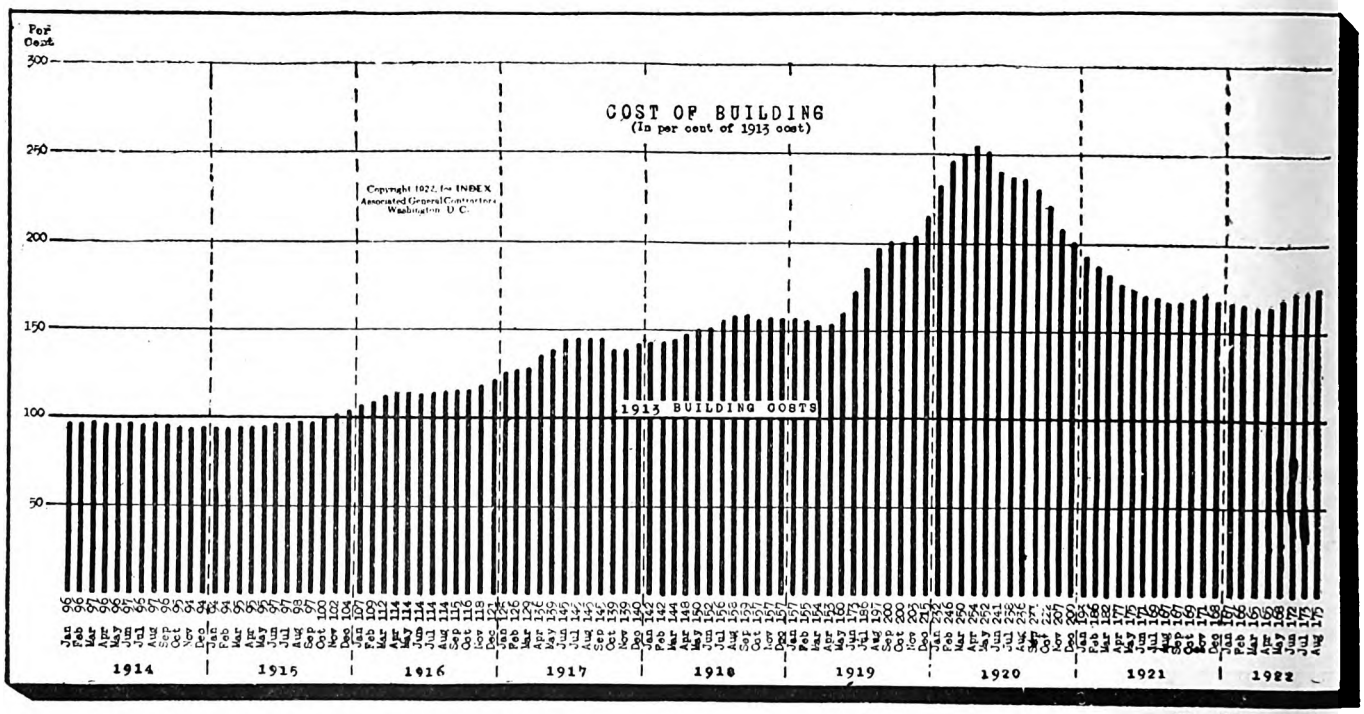
Design of Chemical Plants. Chemical plants as whole are not striking examples of studied design. Need for efficiency in handling materials through stages of chemical manufacture and allowance for future expansion and controlling factors. Other conditions are receiving and storing of raw materials, storage of finished product and flow of materials from raw to finished product stage. Large-scale flow sheet should be first step. Equipment designed for other industries should be considered. Types of installation, like bridge cranes, monorail, etc., considered in their application to chemical industries. Industry today does not generally utilize to best advantage mechanical devices for saving labor. A. E. MARSHALL, *Chem. Met. Eng.*, 8-30-22, 2250 w. CJW.

Practical Pointers on Selection and Use of Hot Air Furnaces for Residences. Discussion of principles of hygienic heating. Super-heated air has same depressing effect as stagnant air, both having vitalizing principles or energizing properties destroyed. R. B. MONFORT, *Building Age*, 9-22, 1500 w. CS.

Code of Ethics. Covers code adapted by National Association of Building Owners and Managers governing relation of members to each other and to community. *Bldgs. & Bldg. Management*, 8-7-22, 500 w. CS.

Underpinning Foundations. An instructive and well illustrated article on the underpinning of foundations of buildings to be removed to make way for the new Standard Oil Building, New York City. Buildings on which leases had not expired and which tenants refused to vacate, yet which were on property to be occupied ultimately by the new building, were supported while new foundations were put under them to serve for the new building. This was accomplished without disturbance to the occupants or settlement of, or damage to the old buildings. RALPH W. CHAMBERS, *American Architect*, 9-13-22, 10,000 w. EMcC.

Factory That Fits the Job. Description of factory, built during the post-war boom days, which is well suited to its work, as well for the expansion of the near future as the present. A suitable layout, and a capable selection of the machinery, transportation equip-



(The Contractor)

Monthly record of building costs since January, 1914. See article at top of page on high level of building costs.

ment and fixtures. Author describes the plan and the way it was developed, then modified to accommodate future possibilities. G. I. RHODES, *American Machinist*, 7-20-22, 2450 w. MAH.

Ventilation of Houses and Apartments. Describing the increased use of small circular fan ventilators set in window frames for ventilating houses and apartments. The fans are usually placed in the kitchen windows to draw out of the house the odors from the kitchen and induce a draft into, instead of from, the kitchen. G. C. POLK, *American Architect*, 9-13-22, 1800 w. EMcC.

Design of Warm Air Heating Plants. The full text is here given of the new code for the design and installation of warm air heating furnaces and pipes in residences. Heretofore this has all been done by empirical rules. The code given was developed through experiments carried on at the University of Illinois for several years. It has been adopted by the National Warm Air Heating and Ventilation Association, The Western Warm Air Furnace and Supply Association, and the National Association of Sheet Metal Contractors. *American Architect*, 8-30,22, 4500 w. EMcC.

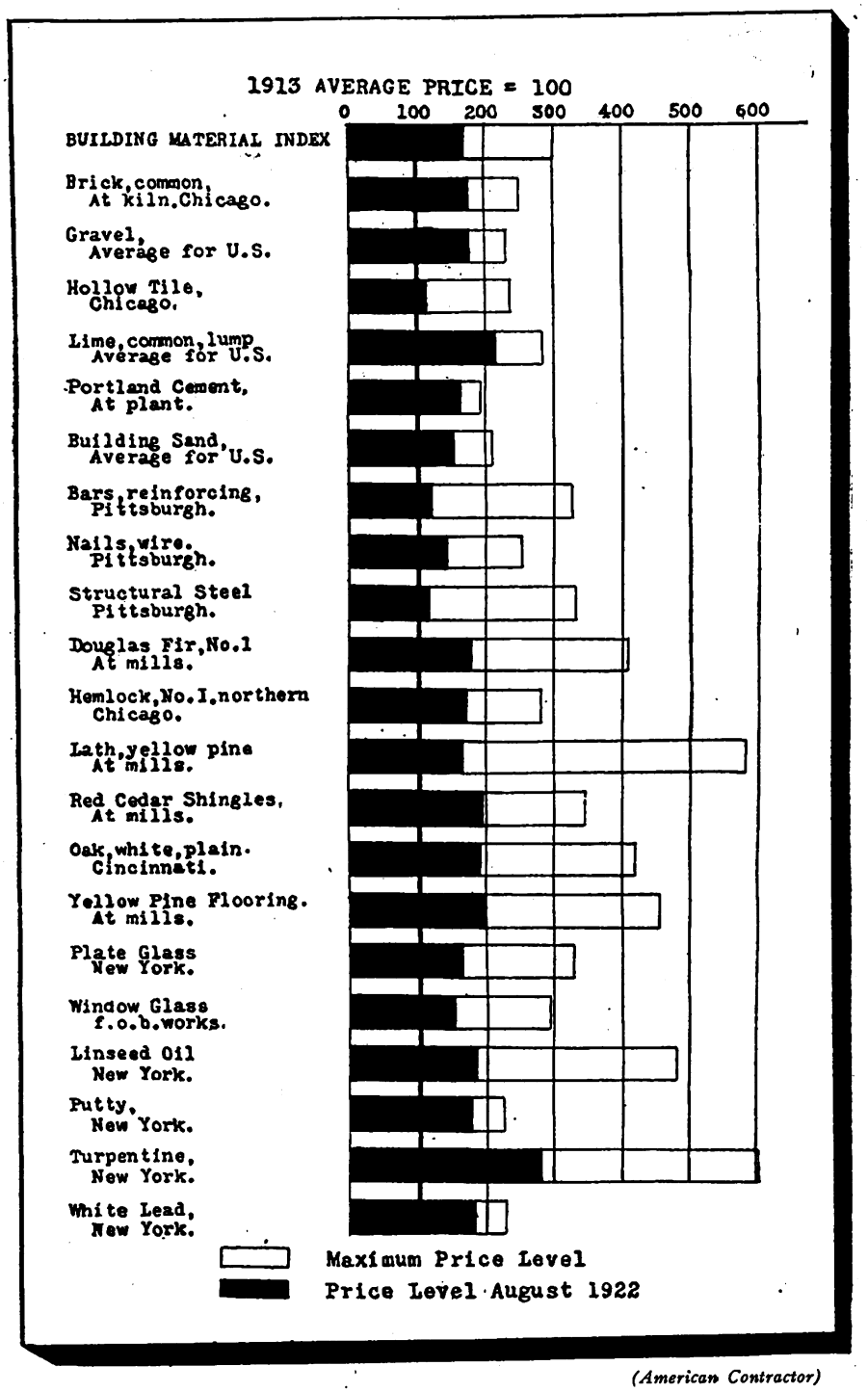
Heat Transmission through Various Building Materials. Full-page table showing results of latest tests on transmission of heat through windows, walls, partitions, floors, roofs, etc., of various materials given in B.t.u.'s per hour per square foot for various differences of temperature. *American Architect*, 9-13-22, 900 w. EMcC.

Ventilation Fundamentals. Five general headings covering ventilation fundamentals: 1. There are no deleterious organic substances in the air expired by normal persons. 2. Carbon dioxide from the exhalations of occupants of a room practically never occurs in sufficient amounts to be harmful. 3. The important factor in ventilation is the maintenance of *thermic* conditions of the air that will take care of the heat given off by the human body without the undue exercise of the heat regulating mechanism. 4. A sufficient quantity of air must be supplied to maintain the oxygen content necessary for breathing purposes and to carry away excessive heat and moisture. 5. Air for ventilation purposes must be practically free from dust, bacteria and other injurious substances. In spite of these fundamentals many members of profession hold diametrically opposite views with regard to desirable methods and show same wide divergence in practice. Discussion of these opinions illustrated by means of synthetic air charts for various buildings. E. V. HILL, *J. Am. Soc. Heating Ventilating Eng.*, 9-22, 12 pp. CJW.

Paint as a Factor in Illumination. Analysis of what paints and shades to use for interior work. The percentage of light reflected is the criterion for the shade to use and the durability of shade is the criterion as to the kind of pigment to use. The following table is instructive:

Paint	Coefficient of Reflection New	After aging one year
Lithopone	0.86	0.80
Flat enamel (magnesia bearing)	0.85	0.82
Gloss enamel.....	0.83	0.83
White lead and oil	0.83	0.75
Calcimine type...	0.82	0.75

The author points out that a knowledge of the durability of the shade and a knowledge of the life of lamps will enable one to figure out when repainting cost balances lamp renewal costs. *American Architect*, 9-13-22, 1800 w.



(American Contractor)

Wholesale prices of building materials (from figures of Bureau of Labor Statistics).

Economy of Wood Preservation. Method used for figuring annual depreciation and replacement cost of treated and untreated timbers, in order to determine when it is economical to use treated instead of untreated timbers for construction. Accompanied by a table giving annual charges on each dollar of cost of timbers in place and life in years before replacement. *American Architect*, 9-13-22, 900 w. EMcC.

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Dye Trade Waits for Tariff Rules

THE dye industry is waiting hopefully, but without undue optimism, for the new tariff to be put into effect. Authorities in the trade have not quite decided whether the Fordney-McCumber regulations will be sufficient to afford them the protection from German competition which they believe they need.

The new tariff regulations are so complex, and involve the application of so many new principles, that importers believe it will be at least three months before the system can be put into operation. According to *Drug and Chemical Markets,* present stocks of imported dyes are sufficient to last that length of time, and textile manufacturers need not feel anxious regarding supplies.

The work of putting the new tariff into effect involves a problem of standardization. Additional chemists, experienced in the testing of dyes, will be needed to assist in the work of classifying importations of dyes and chemicals which are affected by the regulations. It will be necessary to analyze samples both of domestic and foreign products, in order to decide the degree of "similitude" of the two dyes. When this has been done, the appraisers must decide the selling price of the dyes in this market.

Carbon Disulfide. Discussion of manufacture of carbon disulfide from carbon and sulfur in the electric furnace according to the Taylor process. Best results are obtained with good grade of willow or birch charcoal. Both sulfur and carbon employed should be as dry as practicable. Presence of water causes formation of hydrogen sulfide and other volatile sulfur compounds. Usual maximum temperature is about 1000°C. Actual plant data indicate that the units operate with a reasonable thermal efficiency. An approximation of thermal losses is submitted. G. A. RICHTER, *Trans. Am. Electrochem. Soc.,* 9-22, 14 pp. CJW.

Acids. In loading tank cars with acids, matter of free air space is important. Provision should be made for expansion due to change in temperature. Pressure applied to tanks for unloading should not exceed 30 lbs. Attention should be given to placement and condition of dome gaskets. Men loading and unloading cars should be properly protected. In 110-gallon drum at least 3 inches of air space should be left under drum plug. Danger from acid fumes emphasized because gassing symptoms may not develop for hours after exposure. All acid lines in plants should be inspected at regular intervals. Should be as free of sharp bends as possible. Acid burns require prompt attention. Necessary to wear goggles at points where there is any likelihood of splashing of acid. M. F. CRASS, *Chem. Age,* 9-22, 1500 w. CJW.

Chemistry of Photography. Advances in photography consist in deepening of knowledge of fundamental processes and opening up of new points of views. Many new compositions of cellulose and derivatives have been patented. Discussion of gelatin in photographic processes. Important advances in negative emulsions and the latent image. Introduction of new developing agents, if photographically adequate, is likely to depend upon production costs. Other phases of photography discussed. S. E. SHEPPARD, *J. Ind. Eng. Chem.,* 9-22, 3000 w CJW.

Alcohol from Larch. Experimental fermentations of sugars obtained from Western larch indicate that this wood is one of the most valuable sources of ethyl alcohol. By careful regulation of temperature and acidity and by finding proper yeast, possible to convert into alcohol not only sugars obtained from hydrolysis of cellulose but also large proportion of galactose sugar obtained from galactan in wood. Yeast used was pure strain of Hungarian beer yeast; temperature was held between 85 and 90° F and initial acidity was under 5 degrees. Total alcohol yield was at least 33 gallons per ton of dry wood, which is almost 10 gallons per ton greater than that of any other wood studied. Affords means of utilizing waste and also large quantities of butt logs of high galactan content. Forest Products Lab., *Technical Note 176,* 8-1-22, 500 w. CJW.

Perchlorates. Possible use for perchloric acid for preparing electroplating baths, especially for lead, make a cheap source of perchloric acid desirable to electrochemists. A yield of 55% potassium perchlorate can be obtained by heating the chlorate at 480-550° C. for 30 min. to 4 hrs., depending upon the quality of chlorate used. Sodium chlorate gives smaller yields. No catalytic agent or addition substance was found which increased the perchlorate yield, and in most of the things tried, distinctly lowered it. There seems no possibility that the chemical preparation of perchlorate from chlorate can equal the electrolytic method. F. C. MATHERS and J. W. H. ALDRED, *Trans. Am. Electrochem. Soc.,* 9-22, 5 pp. CJW.

Activated Sludge. Activated sludge process is most perfect method of sewage disposal at present time. Two types of modifications of aeration: diffused air and mechanical agitation. Continuous air diffusion method is preferred. Dorr thickeners have been successfully used for settling sludge. Most important unsolved problems are dewatering sludge and sludge drying. Discussion of proposed methods. Dried sludge has excellent fertilizing value. Sale of fertilizer will partially if not wholly offset cost of dewatering and drying, but no profit can be expected. E. BARTOW and G. C. BAKER, *J. Ind. Eng. Chem.,* 9-22. 1500 w. CJW.

Natural Dyestuffs. Popular description of dyes from the mango tree, amarillo, casurina tree, saffron, Indian sweet wood, and Chilean red wood. Illustrated. C. D. MELL, *Textile Colorist,* 9-22, 2000 w. CJW.

Paraffin Wax. American paraffin consists of mixture of hydrocarbons of ethane series varying in melting point from 28 to 75° C. Paraffin distillate is secured from stills having towers. Object of these is to effect separation of fractions being distilled as well as to allow back trapping or return of condensate in bottom of towers to still for cracking reaction. When distillate of still shows signs of chilling at lower temperatures, we are to watch for point of selecting initial cut for paraffin. Next step is to filter press distillate. Wax is then treated with acid and neutralized with soda. Sweating of wax is actual separation of wax from oil under fairly low temperature compared with those obtained in securing paraffin distillate from crude. Methods of determining melting point given. Discussion of odor and color. *Petroleum Age,* 8-15-22, 2000 w. CJW.

Activated Carbon. Activated carbon, prepared from suitable materials and in proper manner contains high percentage of active carbon, is structurally strong, has a great number of very small capillaries, and is commercially useful for absorbing gases and vapors. Used for recovering solvents from air, extracting gasoline from natural gas, obtaining high vacua, purifying helium, etc.; absorption of substances from liquids, such as deodorizing sugar solutions, sirups, edible oils, etc.; as a catalyst in chlorinating natural gas, manufacture of phosgene, oxidation of nitrogen oxides, etc. Process of manufacture. *Chemical Age,* 9-22, 1200 w. CJW.

Centralized Water Softening. Process of centralized water softening capable of great extension, as there are many communities now using hard water where softening plant would be of great advantage to both domestic and industrial consumers of water. Hard water is an expensive and troublesome water to use. More economical to soften entire supply before distribution. Most of experts in recent symposium agreed that lime and soda ash process is practically only one available for softening of entire municipal supply. Requires excellent supervision if after-deposits in water mains are to be avoided. Advantages of soft water given. Educational campaign should include first political and industrial leaders in any community. Esti-

mated that 338 cities in Illinois would require 38,763 tons of lime annually for softening water on assumption of a daily per capitum consumption of 80 gallons. On basis of these figures estimated that entire country would consume 121,328 tons of lime. S. X. HADDEN, *Chemical Age*, 8-22, 1500 w. CJW.

Indigo. Concluding installments of long article on dyeing with indigo. Discusses discharging by chromates, prussiates, nitrates and chlorates. Chromate most generally useful. Perfect white can also be obtained on indigo dyed goods by means of hydrosulfite formaldehydes or sodium bisulfite. Use of formaldehydesulfoxylate for discharging white patterns on materials dyed with indigo and other vat colors is most recent and notable advance in printing industry. Resist or reserve style of printing relates to production of white and colored patterns on solid dyed indigo ground. Differs from discharge style only in process as finished goods are same. Produced by printing resist pastes on white cloth and subsequently passing goods through indigo vat until shade of blue is deep enough. Nitrates, sulfates, chlorides, chromates and acetates of copper, zinc, lead and manganese yield good resists. Formulas. W. B. NANSON, *Cotton*, 8-9-22, 5000 w. CJW.

Wood Preservatives. Properties of good wood preservative are: It must be poisonous to wood-destroying fungi, and be able to penetrate wood thoroughly enough to form continuous exterior shell of poisonous treated wood deeper than any surface checks which are likely to develop, and to retain its toxicity under service conditions. Safety in handling is another important consideration. It must not be a dangerous poison to man and animals, a highly inflammable substance nor a material injurious to wood. If it seriously corrodes iron, steel or brass, its use is limited because of its action on the treating equipment and on bolts and metal fastenings in contact with the wood in service. Color, odor and effect on paint are sometimes of considerable importance. Forest Products Lab., *Technical Note 177*, 8-1-22, 500 w. CJW.

Peat as Fertilizer. Value of peat as fertilizer recently recognized. Description of operations in Whiteside Co., Ill., where about 30 tons are handled daily. Peat excavated along small canal, allowed to dry in sun, then cured for 7-10 days in shed and heated to 1700° F. for 30 min., after which it is ground and screened to 36 mesh. It then forms a dark brown powder, without odor, and so clean that it does not produce the slightest stain. A cubic yard weighs about 1000 lbs. before drying while a cubic foot of the finished product weighs 28 lbs. Also valuable as cattle food, being used in mixed feeds, of which molasses is an ingredient. R. H. MOULTON, *Northwestern Miller*, 8-2-22, 800 w. CJW.

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Specifications for Soap. Series of specifications have been issued by Bureau of Standards for Federal Specifications Board. Each covers definition and specifications, sampling, laboratory examination and reagents. Circular No. 123 covers *white floating soap*, a cake soap at least as good in every respect as one made from soda and mixture of high-grade tallow with 25% to 30% of coconut oil, of good light color, thoroughly saponified and so prepared as to float on water. No. 124 covers *liquid soap*, a clear solution of pure vegetable oil potash (or potash and soda) soap with or without glycerol or alcohol, suitably perfumed and free from all foreign matter. No. 125 covers *soap powder*, a uniform mixture of soap and sodium carbonate in powdered form, which should be readily soluble in tepid water and should contain no free caustic alkali or inert fillers. No. 126 covers *salt water soap*, well made from pure coconut oil and necessary alkali and entirely soluble in both sea water and fresh water and make a suitable lather. No. 127 covers *automobile soap*, a pure vegetable oil paste soap, containing no free alkali or acid, relatively free from materials insoluble in alcohol, homogeneous, free from adulterants of any kind and without objectionable odor. No. 128 covers *chip soap*, soap in chip form made from soda and fats, without rosin, as free as possible from water and all substances other than true soap, of light uniform color, free from disagreeable odor, and suitable for high-grade laundry work with soft water, when the presence of alkaline salts is objectionable. No. 129 covers ordinary *laundry soap*, well-made uniformly mixed laundry or common soap, made from soda and fats, with no excessive proportion of rosin and a moderate amount of matter insoluble in alcohol, free from objectionable odor or makeweights, suitable for use with moderately hard water for general cleaning and laundry purposes. No. 130 covers *grit cake soap*, for fine work such as glass and enamel, containing about nine-tenths of its weight of clean, finely divided siliceous material which will not scratch glass or enameled surfaces, unscented, and of light gray or white color. Cakes to be well compressed and of satisfactory degree of friability which must not be materially affected or lessened after immersion in or contact with water. No. 131 covers *scouring compounds* for fine marble floors, containing about nine-tenths of its weight of clean, finely divided siliceous material, remainder being sodium carbonate or soap or both. *Soap scouring compound* is mixture of finely powdered, light colored siliceous material, sodium carbonate and powdered soap. No. 132 covers *hand grit soap*, a high-grade soap containing about one-third its weight of clean, finely divided insoluble siliceous material, as free as possible from water, either uncolored or colored as indicated in contract, thoroughly saponified and well compressed in firm, smooth cakes. Each circular contains about four pages and may be obtained from Superintendent of Documents, Washington, D. C., for 5 cents. All issued 7-27-22. CJW.

Toilet Soap Perfuming. Fallacies in this art are, an odor successful in other toilet articles can be cheapened or slightly modified to give the corresponding effect in soap. A perfume will not be greatly affected by the soap base itself. The exact degree and shading of a perfume possible in other articles can be secured in the case of soap. A small amount of perfume oil will suffice in soap, just as it does in many other toilet materials. That the odor of the oil itself must be fine and delicate, rather than strong or even coarse. These false ideas are based upon ignorance of the characteristics of soap and the essential requirements for a soap perfume. Discussion of effect of manufacture and raw material upon properties of soap (odor) are discussed. A. C. LANSING, *Am. Perfumer*, 8-22, 800 w. CJW.

Specifications for White Lead. Basic carbonate white lead shall be the product made from metallic lead and shall have composition corresponding approximately to formula $2\,PbCO_3.\,Pb(OH)_2$. Paste shall be made by thoroughly grinding above pigment with pure raw or refined linseed oil, and shall contain 90-92% pigment. Methods of sampling and laboratory examination are given. Officially adopted by Federal Specifications Board, Feb. 3, 1922. Bureau of Standards, Circular No. 84, 2nd Ed., 7-3-22, 8 pp. CJW.

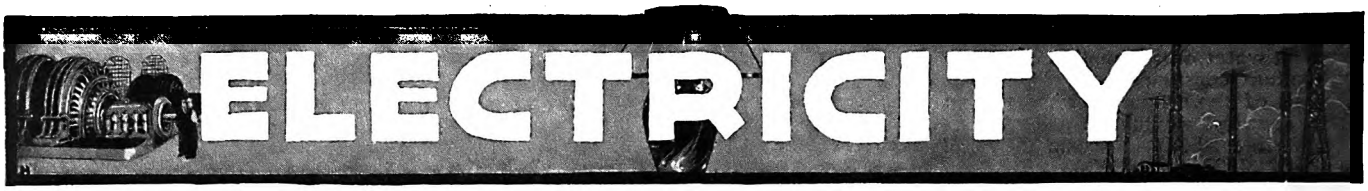
Specifications for Interior Varnish. Specifications for varnish suitable for general interior use, including both rubbed and unrubbed finish, exclusive of floors. Manufacturer is given wide latitude in selection of raw materials and process of manufacture, so that he produces varnish of highest quality. Must be clear and transparent, not darker than solution of three grams of potassium dichromate in 100 cc. pure sulphuric acid, flash point not below 30° C. (85° F.), not less than 45% nonvolatile matter by weight, set to touch in not more than 4 hrs., dry hard in not more than 24 hrs., and dry to rub in not more than 48 hrs. Film on metal must stand rapid bending over a rod 3 mm. in diameter. Dried film must stand application of cold water for not less than 18 hrs. without whitening or showing other visible defects. Officially adopted by Federal Specifications Board, Feb. 3, 1922. Gives method of sampling and laboratory examination. Bureau of Standards, Circular No. 117, 2nd Ed., 7-3-22, 6 pp. CJW.

Paint Industry. Most important advance in 1921 was introduction of titanium oxide commercially. Produced from double oxide of titanium and iron (ilmenite) by treatment in electric furnace and leaching with sulfuric acid, finally treating with barium sulfate to give product (Titanox) containing 75% barium sulfate and 25% titanium oxide. It makes a soft film with oil and is mixed with 25% to 40% zinc oxide to harden it. Care in processes of manufacture of lithopone has made it less liable to change by action of light. A. H. SABIN, *J. Ind. Eng. Chem.*, 9-22, 500 w. CJW.

Naval Stores. Summary review of progress during 1920-1921. New sources of resin found in pine forests of China. Chemistry of rosin, the principal resin, still incomplete. Discussion of methods of analysis and of uses. F. P. VEITCH and V. E. GROTLISCH, *J. Ind. Eng. Chem.*, 9-22, 4000 w. CJW.

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Automatic Telephones

INSTALLATION of the first automatic switchboards to be used in the telephone system of New York City has just been completed. Seventeen hundred subscribers are served by the new apparatus, and in time the automatic system will be extended until it reaches every one of the 1,044,000 telephone users in the city.

Engineers have spent two years in building the machines which have just now been placed in use. Seven million soldered connections had to be made by hand before the wiring was completed. Since the remodeling of only one central office involved all this work, and since there are 109 central offices in New York City, the task of installing automatic telephones in the metropolis is tremendous.

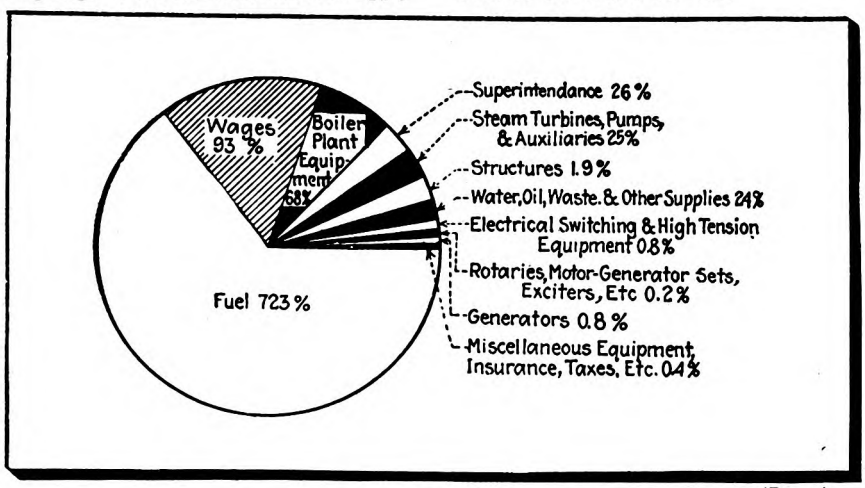
Installation of machine switchboards will be completed in one other central office in December, and in a third during the early months of 1923. Engineers in charge of the work refuse to predict when the job will be completed, but it has been authoritatively stated that the job will require ten years more.

Having proved of much value in scores of smaller towns, the automatic telephone is gradually making its way into the larger metropolises, and it is confidently predicted that it will supersede the "hello-girl" phone before many years go by.

Electrical Equipment. Safety of electrical equipment depends on (1) correct principles of design; (2) proper assembly of parts at the factory; (3) proper assembly and installation of equipment at the mine; (4) and proper operation and maintenance after installation. The first two factors are within the province of the manufacturer. The Bureau of Mines either inspects and tests several models of one product, such as electric cap lamps, or one model, such as an electric motor. If this series of tests proves satisfactory, the manufacturer is given the privilege of making other appliances, and assembling them in the same way; the approval plate he attaches is his guaranty that the equipment is identical with the one tested and inspected by the bureau. The third and fourth factors concern those who use such permissible equipment, and it is to them that this paper is mainly addressed, in an effort to show their responsibility in rendering electrical equipment safe for use in gaseous mines. If machines never wore out; if parts never became loose or broken; if wiring never deteriorated; and if batteries never needed replacement, there would be no need of detailed instructions for maintenance of permissible equipment. But all persons connected with mining operations know that wear and tear start from the beginning of use, and that constant attention must be given to upkeep. Recommendations that apply to the operation and maintenance of nearly all makes and classes of permissible apparatus are given. L. C. ILSLEY, *Bureau of Mines, Technical Paper,* 306. CJW.

Electric Motor Control. Nearly all types of motors require some type of starting apparatus to limit initial rush of current which tends to pass through winding when the armature or rotor is at rest. For direct current motors these take the form of a rheostat. In alternating current motors, starting may be accomplished by inserting resistance into rotor circuit by means of a transformer with low voltage tape, with a starting compensator or auto-transformer or by changing connections to armature coils by means of switch. Discussion of starting boxes, starting induction motors, speed control, series motor speed control and speed control of induction motors. *Power Plant Eng.,* 9-15-22, 2500 w. CJW.

Rates, Competition and Reasons in Central Stations. A general discussion showing the cost of capital, the condition of the market for central station securities, the reduction of prices and rates, the theory of stock values, etc. Central station securities are said to be safer than national bank. The effect of tight money on rates is also described. N. HARRISON, *Central Station,* 9-22. IG.



(Power)

Distribution of operating expenditures of a large central station.

Estimating Wiring Costs. Best method of estimating wiring costs is by the unit of material and labor cost system. System should apply to every job. Four distinct items of construction in home wiring can be scheduled and made uniform in price to the extent that they are so constant in cost that there is very little variance from the unit of labor and material method. These units are service-meters-circuits and outlets. Details of drawing up a cost sheet on this basis are given. J. W. COLLINS, *Central Station,* 9-22. IG.

Wiring of Finished Buildings. Description of procedure followed and methods used in wiring of seven-room frame residence, erected 12 years ago, without the use of panel boxes. Knob and tube method used. Details of the installation are shown. T. CROFT, *Electrical South,* 9-22. IG.

New Telephone Regulation Theories. Michigan commission's opinion in Bell state-wide case offers food for thought. Exchange rates classified in accordance with groups. Various features of the decision are discussed. *Telephony,* 8-12-22. IG.

Making Radio Parts. The methods employed by the Newark Engineering & Tool Works, Newark, N. J., in making radio head-phones are described in this article. Some of these operations, which are described in detail, include drawing and threading the aluminum case, making the magnetic coils, assembling the fiber flanges, punching out the centers of the permanent magnets, and others. FRED R. DANIELS, *Machinery,* 8-22, 1500 w. MAH.

Vacuum Tubes. The various properties and characteristics of the vacuum tube are discussed. It is shown how the tube provides a destination for the electrons. The vacuum tube as amplifier and detector in radio receiving sets. Various diagrams are shown of connections, etc. H. R. FRITZ, *Telephony,* 8-5-22. IG.

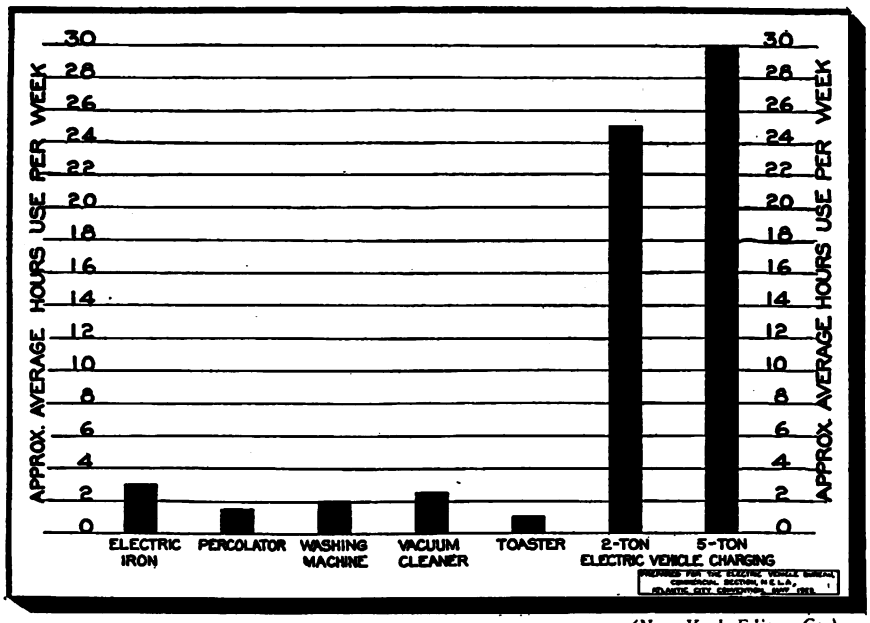
Three-Stage Radio Frequency Amplifier. Description of an instrument of the laboratory type which is designed to cover a wave length range of 150 to 500 meters. The assembling, wiring and operation of the amplifier are discussed in detail. M. B. SLEEPER, *Radio News of Canada,* 9-22. IG.

Electric Heat. Heat may be developed by passage of current through solid, laminated or granular conducting medium or "resistor," by flow of current through liquid or fluid conductor and by flow of current through gas or air. Industrial processes to which electric heat may be applied naturally group themselves into more or less well defined classes, of which 20 are given. These processes are commonly carried out in classes of equipment commonly designated as devices, heating or melting pots, ovens, heating furnaces, melting furnaces and special high temperature furnaces. General discussion of question of heat, heating curves, resistances, heat transfer, etc. Proper design and application of electric heat to industrial processes require engineering skill of highest order. Involves not only knowledge of particular characteristics, both physical and chemical, of process involved, but the heating device in question should be of such design as to take account of at least laws governing chemical, mechanical, physical conditions as well as those of environment and economics. Emphasizes need of advice of competent furnace engineer. E. F. COLLINS, *Trans. Am. Electrochem. Soc.*, 9-22, 28 pp. CJW.

Lighting Small Stores. Lighting unit for small stores must fulfil several requirements. It must have a relatively high output to keep cost of operation as low as possible. Must not expose bright filament to view, but must soften or diffuse the light. First cost must be low. Must be neat and simple in appearance. It must not concentrate light in a narrow angle but emit considerable flux to the sides to illuminate the wall shelves. An excessive amount of dirt must not be accumulated by it, and it must be easy to clean. Details of the system are given. Emphasis is laid on the size of the lamp and the spacing of the outlets. The special requirements of various classes of small stores are discussed in detail, such as bakeries, barber shops, cigar stores, clothing, dry goods, haberdashery, millinery and women's wear stores, delicatessen, dairy products, groceries and metal markets. (To be continued.) A. L. POWELL, *Electrical South*, 9-22. IG.

Practical Methods in Lighting Steel Mills. Special treatment of problem is required in order to secure effective lighting with economy. Largest part of problem is concerned with knowing how to install lighting devices that will meet legal demands of hygiene, mechanical safety and fire hazard. It is evident that adequate lighting insures efficient work and reduces accident hazards, particularly in heavy machine work. Various types of reflectors are used. Double row of R. L. M. standard dome reflectors with 500 watt Mazda C lamps gives good results in lighting roll shed. Yard and track lighting is discussed. D. W. ATWATER and J. J. MCLAUGHLIN, *Electric J.*, 9-22. IG.

Electrification of Chemical Industries. In chemical and allied industries electrification is probably employed as extensively as in any other industry. Main advantages of motor drive are lower power costs, increased production, generally improved plant and working conditions. Electricity is inherently more economical than steam in great majority of applications, on account of its high electrical efficiency, low maintenance expense of equipment, convenience and operating simplicity. Discussion of equipment. In addition, large blocks of power are used in electrolytic and electrometallurgical operations. Possible applications of electric heat are in heating kettles, vacuum chambers, evaporators, autoclaves, stills, vulcanizers, and heating, drying and enameling ovens. C. B. GIBSON, *Chem. Met. Eng.*, 8-30-22, 2500 w. CJW.



(New York Edison Co.)

The comparative usage of connected capacities of electric trucks and household appliances.

Mill Electrification. Early European and American installations compared. From standpoint of durability and maintenance electric machinery in general ranks high. General trend in all industries is toward electrification. Centralization of power is coming or is already here. One great impetus has been development of adequate and reliable gearing. American motors are stronger mechanically than European machines, and in general construction are superior. Discussion of power economy. B. G. LAMME and W. SYKES, *Iron Trade Rev.*, 9-14-22, 3000 w. CJW.

Phase Advancer. Advancer is small low-voltage 3-phase commutator-type exciter, designed to carry the secondary current of the motor with which it is used, and whose function it is to supply magnetizing current for wound rotor motors and thus raise the power factor. By adjusting speed of the advancer the operating power factor of the motor may be adjusted to any value up to 100%, or can even be made leading. Speed and efficiency of motor are not affected materially on account of the low resistance of the armature winding of the advancer. Discusses performance, rating, construction, drive, power required, control, operation and reliability. Has not been developed for commercial application as yet. F. S. WHEELER, *Power Plant Eng.*, 9-15-22, 800 w. CJW.

Carbon Electrodes. Concluding article which reviews finishing steps in electrode manufacture and discusses properties and other factors affecting requirements for use in electrolytic and electrothermic applications. Economics of industry and trend of developments. Cost of any particular size of electrode will depend upon difficulty of forming that particular shape in the green, percentage of scrap normally resulting and necessary to reprocess, difficulty or ease of loading, baking and cleaning particular shape and size, percentage of breakage, replacement and excess necessary to complete order. In case of both graphite and amorphous carbons, percentage of breakage during and after baking is serious item. Properties of electrothermal electrode are: high electrical conductivity (low resistance), slow rate of oxidation (high apparent density), great mechanical strength (particles well bonded together, suitable aggregate and thoroughly mixed), good shape and accuracy of dimensions, precise machining and low heat conductivity. C. L. MANTELL, *Chem. Met. Eng.*, 8-23-22, 5000 w. CJW.

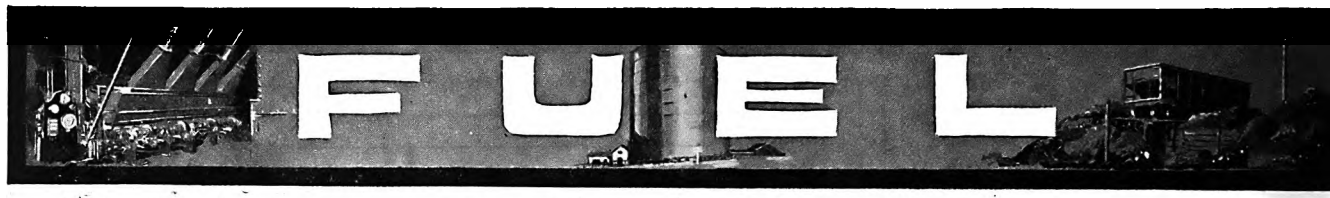
Dry Cells (continued). This article deals with theory of dry cell behavior in an electrical circuit, including effect of grouping, internal resistance of cells and other circuit characteristics. Power expended in cell increases as square of current flowing. Resistance is small in new cell, but increases with age and use of cell. Due to formation of double and basic chlorides which take up water in their formation and clog pores of paper lining or paste, as well as incrust surface of zinc. Two factors involved in grouping cells, voltage requirement and current requirement. Better to arrange cells in parallel groups which are then put in series than to arrange cells in several rows and connect these rows in parallel. G. W. VINAL and L. M. RITCHIE, *Chem. Met. Eng.*, 9-20-22, 1600 w. CJW.

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The Present Opportunity for Gas

"WITH electricity so much to the fore, there is a tendency to go the whole way and imagine that the manufactured gas industry is at the end of its tether in face of electrical competition," so states *Gas Age Record*. But the chief error in this reasoning, according to this publication, is that manufactured gas and electricity are in no sense competitors. Each has its separate and distinct place in modern life. Manufactured gas is the perfect fuel, while electricity is the most economical power. Advertising, it is pointed out, is needed to drive home these truths. It is probable that there was never a more opportune time than the present to increase the number of gas users throughout the country. The nation's coal bins are empty and the very mention of fuel gains immediate attention.

While many gas heaters will be sold for temporary use, this is only half the task. The real job is to make temporary users permanent users by selling them the idea of the convenience and economy of gas as a fuel.

The growth of the gas industry in the United States is well illustrated by the following figures for the last year, as reported by *Gas Age Record*:

"Total population of districts supplied by 939 companies was reported as 57,922,550, or about half the population of the country.

"Total output of manufactured gas by 863 companies was 291,284,854,477 cu. ft.; in addition 26 by-product coke oven plants sold to distributing companies 14,391,390,514 cu. ft., making a total gas output of 305,676,244,991 cu. ft. during one year.

"Miles of mains were reported by 937 companies as 70,804,709.

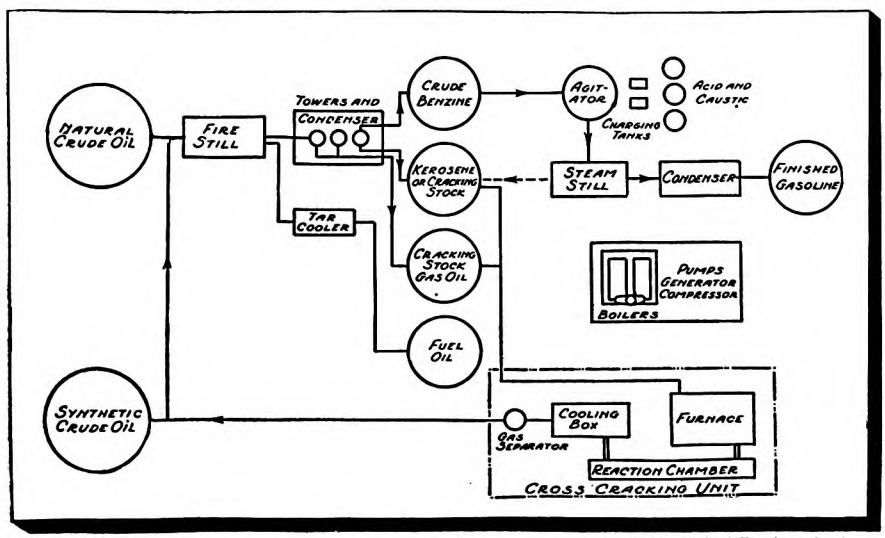
"Consumers' meters were reported by 934 companies as 9,114,297, divided as follows: 904 companies with 7,880,127 regular meters; 529 companies with 1,212,617 prepayment meters, and 211 companies supplying 21,553 industrial meters."

Colloidal Fuel. Colloidal fuel is liquid fuel mixture of pulverized coal or coke stably suspended in mineral oil or blended oil and liquid derivatives of coal. May be secured by adding to oil a soap, such as lime-rosin soap, or by digesting coal with moderate percentage of creosote or other coal distillate at 180° F. for over an hour. The plant necessary is comparatively simple and inexpensive. Technical advantages are that available quantity of oil will serve to yield considerably larger amount of liquid fuel, fine sizes of coal may be given profitable use and liquid fuel value, heat units in colloidal fuels are as efficient as those in oil and sometimes more so. Since heat units in coal or coke are much lower in cost than heat units in oil, cost of heat units in mixture will be lower than cost of manufacture until cost of oil falls so low that cost of manufacture balances the economy. Conflagration can be extinguished with ordinary fire appliances and water. Because of high specific gravity mixed fuel in which good grade of coal is used possesses greater heat value per unit volume than oil, although showing less per unit weight. Use by railroads discussed. L. W. BATES, *National Petroleum News,* 8-16-22, 1500 w. CJW.

Gas Making. Gas works operation is not extra hazardous. While possibilities for serious accident exists, these have been recognized and brought under high degree of control with corresponding reduction of probabilities of human injury and financial loss. Factors involved are: interest and support of accident prevention by management and operating executives; adequate, efficient, practical accident prevention system; good equipment and apparatus, efficiently kept up and adequately guarded; suitable safety devices, first aid appliances and methods; highest type of medical care; correct operating system, including rules and instructions, requisite cleanliness, sanitation, ventilation, space, order and neatness. F. W. FISHER, *Gas Age-Record,* 9-9-22, 3000 w. CJW.

Fuel Oil. Address consisting in answering following questions: What physical changes must be made in coal-burning boiler to prepare it for fuel oil? What will such changes cost per boiler HP? Effect on insurance? Benefits in monetary or other form? Price and cost of oil? Permanency of fuel oil supply? What will happen in a severe winter? Claimed that we have only begun to tap vast oil resources of world; what is now being used is only small percentage of immense quantities that will yet be brought to surface. W. C. MCTARNAHAN, *Buildings,* 9-4-22, 3500 w. CJW.

Alcohol as Fuel. At all speeds, both with high and low compression, thermal efficiency was higher with alcohol than with petrol or benzol, and is equally high at high or low compression. Tendency to pre-ignition began to be evident at 7-1 compression ratio. Fuel consumption is higher in case of alcohol due to lower heat value. Throttle tests showed that behavior of alcohol and petrol under variations of throttle conditions was identical. Power output of engine was slightly diminished with increasing jacket temperature. Maximum output is obtained from engine when no heat is supplied to ingoing air, but thermal efficiency is slightly increased with increase of heat to carburetor. Under all conditions engine runs more sweetly and more smoothly than when running in petrol. No evidence of any corrosion of valves. 90% alcohol seemed to work better than 99%. ROY ALDEN, *Oil News,* 9-5-22, 800 w. CJW.



(Mechanical Engineering)

Flow sheet of synthetic-gasoline plant in which all the crude oil is made into gasoline and fuel oil.

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Outlook for Glass Industry Improving

ALTHOUGH manufacturers of all lines of glassware have been showing a desire to work on orders as closely as possible, the *Crockery and Glass Journal* believes that business in the glass trade is making considerable progress, and that conditions are healthy.

China and glass departments in the city department stores show an increased activity, and the entire general line of glassware appears to be in favorable position. Inquiries concerning holiday lines are also being received occasionally. *The Glass Worker* reports that the market for blown ware has been extremely strong and is expected to continue so. Expensively decorated glassware has been meeting with much success, and factories and shops decorating this class of glassware report business very good. Advancing labor costs, common labor especially, and an increase in the price of important raw materials are tending to strengthen prices.

Bottles and containers are reported to be in demand and several factories have not yet caught up with the rush of orders received during the summer.

The demand for window glass, ushered in by the building boom, shows no signs of slackening, according to the *National Glass Budget.* Several months of satisfactory business is expected, provided transportation difficulties do not interfere with the deliveries of orders.

Glass Technology. Review of recent progress. Most outstanding work that of Adams and Williamson on annealing of glass. Much additional work necessary to correlate physical properties with chemical composition and constitution. Subject appears difficult, because with more accurate determination of physical properties, futility of attempting to represent any property of glass on purely colligative basis becomes apparent. Sheet glass drawing process has now reached stage where 84-in. sheets can be drawn. Striking development is rapid extension in field of application of glass feeders. Field of automatic machinery has been extended to bulbs. Semi-automatic machinery has been extended to tumblers and thermos bottle liners. G. W. Morey, *J. Ind. Eng. Chem.*, 9-22, 2500 w. CJW.

White Flint Glass in Tank Furnace. First essential was suitable tank, which should be sufficiently deep and long for melting and fining to be complete before metal passed through doghole. More care could be used in weighing out and mixing ingredients of batch, and raw products and finished batch should be analyzed. Mechanical mixer is essential and amounts of decolorizer were so small that bad mixing resulted in patchy color. Decolorizer acted as "covering effect." Selenium used. Properties of selenium. Regular and correct melting temperature must be maintained. Generally 1350-1400°C gave good results. Total iron content in finished glass must be kept constant and fresh components of metal should be checked regularly by complete analysis. Lehr temperatures should be correctly ascertained for given type of glass and kept constant by use of some form of temperature recorder. F. W. Adams, *Glass Worker*, 9-9-22, 1500 w. CJW.

Magnesia in Glass. Magnesia glasses are superior to lime glasses when corroding agent is water. Substitution of small amount of magnesia for soda (up to 3.5 molecules per cent) is more effective in improving durability toward hydrochloric acid than use of corresponding amount of lime; but for larger amounts of magnesia and lime, the glass containing the latter is slightly better. Magnesia glasses are very distinctly less resistant to attack by either caustic soda or sodium carbonate solution than corresponding lime glasses. Over the whole range tested, sodium carbonate is much more corrosive than caustic soda. Thus, magnesia glasses appear to possess a slight advantage over lime glasses in regard to corrosion by water; no advantage in the case of hydrochloric acid and to be decidedly inferior in the case of alkaline solutions. W. E. S. Turner, *Glass Industry*, 9-22, 1000 w. CJW.

Glass Plant. Complete, illustrated description of the U. S. sheet and window glass plant at Shreveport, La. Outstanding feature is amount of mechanical handling. J. B. Krak, *Glass Industry*, 9-22, 2500 w. CJW.

Manufacturers in Sweden are making a new type of cut glass, cheaper than plain glass and more beautiful.—*Dearborn Independent.*

Firing Ceramics in Electric Furnaces. Properly designed electric furnaces are dependable for ceramic firing at temperatures up to 1100° C. Grinding wheels have been produced by the use of electric furnaces in shorter time and of greater wearing durability than is possible in the kiln process. Cleanliness of atmosphere, uniformity of temperature control and other features of electric furnace operation have made it very adaptable in automobile and china industries, and in manufacture of glassware and bi-focal lenses, where substantial reduction in the percentage of rejects has been experienced. E. L. Smalley, *Trans. Am. Electrochem. Soc.*, 8-25-22, 1200 w. CJW.

Pressing Terra Cotta. Question of proper pressing of terra cotta should have careful consideration. Failures of terra cotta at the building are more often due to some fault in pressing than to any other cause. After face is in place, sides should be put in first and ends last, so that there is greater opportunity to wedge ends to sides. Bad practice in working up the face to bring up some of the clay to distance on sides of mold until it is thin as paper. After pressing, care should be taken that it does not stay too long in mold before being turned out on to board. Well-pressed piece needs very little finishing. Illustrations of good and bad practices. John Clark, *J. Am. Ceramic Soc.*, 9-22, 1600 w. CJW.

Pressing Department. Terra cotta is hand pressed. Eternal vigilance is price of quality. Illustrated description of method of building up sides, partitions, preventing warping, projecting parts, turning to obtain uniform drying, and finishing of terra cotta and columns. Possible to manufacture almost any sort of terra cotta shape, provided it is given proper amount of attention and nursing. This may mean excessive cost, but this is really the criterion of whether given shape is commercially practical. T. A. Klinefelter and F. C. Parsons, *J. Am. Ceramic Soc.*, 9-22, 2000 w. CJW.

Control of Biscuit Losses. Subject of biscuit loss and its control is one of great importance to average general ware manufacturer. Chief factor in control of biscuit losses is transverse strength of body in the clay state. If modulus of rupture is maintained at 280 lbs. per square inch, the effect of careless handling of ware is offset and human element automatically controlled. The effect of the human element is also made less effective by not taking ware off molds until it is bone dry. Daily analysis of damaged 7-in. plates will give early indications of such chronic troubles as too weak a body, careless handling, improper firing, or too rapid cooling of the kilns. Such losses as edge cracks, cup handles coming off, etc., can best be detected and controlled from analysis of brusher's report. Ira E. Sproat, *J. Am. Ceramic Soc.*, 9-22, 3000 w. CJW.

Standardization of Refractories. Emphasizes cooperation between private, semi-public and public, associated and individual research agencies, which has made possible present rapid advance in knowledge of ceramics and refractories. No classification of refractories yet made is satisfactory and such cannot be made with present information. Standard tests do not check with operating results, due to inadequacy of our knowledge of industrial requirements. R. C. Purdy, *Chem. Met. Eng.*, 9-27-22, 1200 w. CJW.

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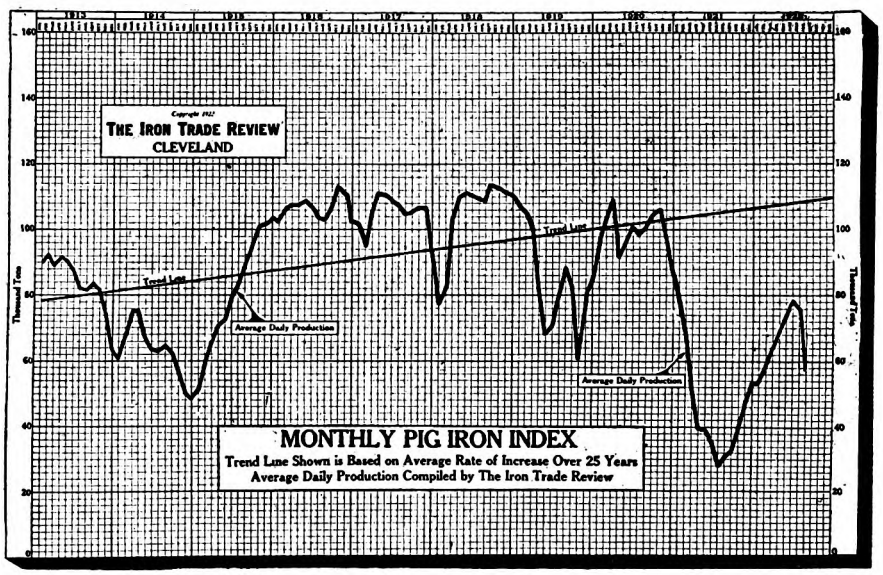


Steel Production Restricted

IT is predicted that steel production will be restricted to about 65% of capacity during the remainder of the year on account of fuel, labor and transportation shortages. This rate compares with 75% attained just prior to the coal strike and 50% at one time last August. Many mills and furnaces are reported to be piling up an increasing amount of their current output, and in the Mahoning Valley the congestion of stocks has become so great that a partial shutdown of plants is imminent.

Inability of reinforcing bar fabricators to obtain an adequate car supply is resulting in a slowing down of business in the concrete bar market, and in delaying work that has been started. Bars are piled up waiting shipment, congesting the shops and mills and forcing delay in booking other business. Small orders are in a somewhat better position, as many of these are being shipped by motor truck.

As a result of the recent blowing in of furnaces, the *Iron Trade Review* states that new sources of supply have been opened to buyers of iron, broadening competition and producing an easier tone in the market. The trend of pig iron production from February 1, 1913, to August 30, 1922, is shown in the accompanying chart.



Monthly pig iron production index 1913-1922. The trend line is based on average rate of increase over 25 years.

Electrolytic Iron. The initial effect of annealing on electrolytic iron is very marked hardening, reaching a maximum at an annealing temperature of 300-400°C. The corresponding scleroscope number is 45. At the same time the initial brittleness is removed. Annealing at higher temperatures results in progressive softening, consummated above 900°C. Microstructural changes and the rate of decomposition of the unstable iro-hydrogen compound are discussed in relation to the hardness change. N. B. PILLING, *Trans. Am. Electrochem. Soc.*, 9-22, 9 pp. CJW.

Nickel-Chromium in Cast Iron. In general, with low to medium total carbon, low nickel chromium with low to medium phosphorus ranges give better tensile strengths than higher phosphorus with either zero or high nickel chromium. The higher the total carbon the lower the Brinell numbers or softer the metal. Whether phosphorus is low, medium or high element in question, evidently has but little effect on the hardness of cast iron as compared with that of total carbon content. Effect of nickel chromium is definitely marked as increasing hardness with rising percentages. General showing that conception of hardness in cast iron and strength must be kept distinctly apart and that further investigations should be made to get more information on this subject. RICHARD MOLDENKE, *Mining & Metallurgy*, 9-22, 500 w. CJW.

Steel without Pig Iron. The charge consists of manganese ore, lime, scrap steel and scrap iron. Regulation of mixture depends on market conditions and requires constant study of price and availability of scrap brought in from outside. Flexibility of charge is its feature, it being possible to make heat with 90% scrap steel or up to 40% scrap iron with no variation in quality. Another factor is carbon in form of coal, coke or charcoal, the amount depending upon conditions. River coal is being used at present time. Purifying effect of residual manganese is key to success of this unique "scrap and carbon" process. All ingots are bottom poured, requiring metal of high temperature. This is secured by special features in construction and operation of furnaces. Neats are regularly made not exceeding 0.05% sulfur, much less often, and phosphorus content is normal. Steel made by this process has higher properties than steel made in old way. Yields are larger and total rejections are less than ¾ of one per cent. Success requires constant watchfulness and high-grade organization. E. F. CONE, *Iron Age*, 9-7-22, 1000 w. CJW.

Chromium Steel. Centrifugal casting of chromium alloy steel gives product which shows same grain on annealing as forged billet. Open up important theoretical and practical possibilities. Indicates that it is possible to cast steel in such a manner as to avoid dendritic ingot structure. Metal was cast in rotating mold at 1700° F. Cooling was comparatively slow and in stationary mold operated under similar conditions one would have obtained columnar crystals and coarse grain structure. Most likely explanation is that the mechanical stirring due to rapid rotation of mold (1400 r.p.m.) affects the grain size and possibly also the powerful impingement of hot particles of the metal on the layer next to it outwardly. In the process of cooling this impingement may prevent by purely mechanical means the growth of the crystals and the peculiar ingot dendritism. L. CAMMEN, *Iron Age*, 9-14-22, 600 w. CJW.

Tensile Properties of Boiler Plate. Tensile properties of firebox steel at temperatures up to and including blue-heat range (295° C.) are independent of rate of loading. At 465° C. the tensile strength appears to increase slowly with rate of loading while ductility as measured by elongation and reduction of area is practically constant. If load is increased 100 lb. at 5-min. intervals over definite range at each temperature, and subsequently test specimen is broken at standard speed, strength is raised and ductility is decreased at 156°, but steel exhibits decreased strength and higher ductility when so tested at blue-heat or above than when broken in the ordinary manner. H. J. FRENCH, *Chem. Met. Eng.*, 8-16-22, 1000 w. CJW.

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METALS

Wages Increased in Copper Mines

DUE to increased buying on the part of domestic consumers a better tone is noticeable in the copper market. Excess stocks have been materially reduced and foreign buying has been most encouraging. Practically all of the companies are now operating. Demand for brass products is reported to show an encouraging increase, and that for rolled products continues at a fair rate. *The New York Commercial* believes that it is only a question of time when the increased cost of production, due to higher wages and fuel, will be reflected in an advance in the cost of copper, which was held unchanged at the present levels for over two months.

The Engineering and Mining Journal states that an outstanding development in the copper situation is the disposition shown by many of the leading copper-mining companies to increase the wages of their employees. This movement, which began in Utah, has spread to practically all the leading companies in the West. Wages have been raised as a direct answer to the shortage of labor, which shortage, so far as the domestic nonferrous metal mining industries are concerned, threatens to reach serious proportions.

Acid-Resisting Metals. Conditions to be met are: Must be good from foundry standpoint, must machine well and not be too hard, must have certain physical properties which are under control and which enable manufacturer to comply with any reasonable specifications, must be reasonable in price. Principal need is in manufacture of mine pumps, where sulfuric acid is encountered. Structure or grain of metal or alloy is major point in its acid-resisting qualities. In laboratory tests, only corrosion to be considered but in actual use must also consider erosion and sometimes electrolysis. Lead-base alloys are more resistant to dilute sulfuric acid solutions than copper- and nickel-base alloys. Monel metal and Meco metal (nickel-base alloys) are more resistant to concentrated than dilute acid. Problem complicated by effect of temperature. Meco metal resists corrosion but it has as yet been impossible to give it necessary strength. G. A. DRYSDALE, *Mechanical Eng.*, 9-22, 1600 w. CJW.

Tellurium. Whole commercial supply of tellurium obtained as by-product from copper ores, being found in flue dust of smelters, electrolytic slimes and in fumes and slags resulting from cupellation of gold and silver ores. Present demand only few hundred pounds per year. Uses very limited. Suggested use as antiknock in gasoline motors would require 1500 tons per year. No ores are known that are rich enough in tellurium to permit mining and treatment for tellurium alone. Qualitative and quantitative tests given. H. A. DOERNER, Bureau of Mines, Reports of Investigations, No. 2385, 8-22, 750 w. CJW.

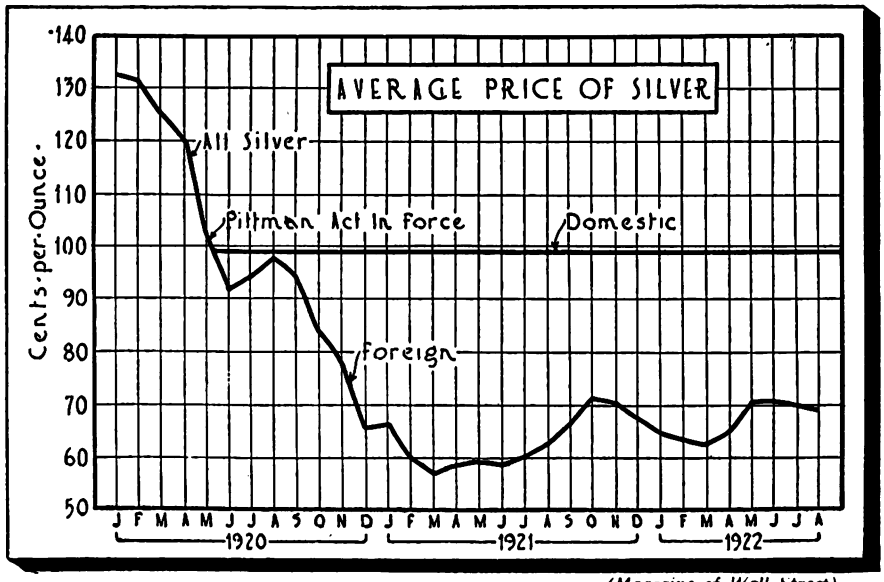
Uranium Ores. Asphaltites carrying uranium are exceedingly rare. Such deposit occurs in Temple Mountain, Utah. Distribution is apparently as erratic as deposition of sandstone in conglomerate and special sorting is necessary. General geological description given. Origin of the ores uncertain. FRANK L. HESS, *Eng. Mining J.-Press*, 8-12-22, 2500 w. CJW.

Diamond Alloy—A New Cutting Metal. This is a new very hard alloy, the components of which include chromium, molybdenum and tungsten, each one of which is itself unusually hard. The result is an alloy which is so hard that it cannot be forged, but may be cast in the desired shape. It is non-magnetic, and not affected by speed and feed which raise the temperature almost to the fusion point without softening the cutting edge or affecting its ability to continue cutting. The article describes the material in much detail, shows a large number of different cutting tools which have been made from it, and describes the remarkable performances of some of these. *Machinery*, 8-22, 1025 w. MAH.

Metal Wool. Little is known generally about process. Review of patents granted on subject. Latest patent Apr. 8, 1919. Steel wool consists of long steel fibers resembling curled hair. Graded according to fineness from coarse shavings to wool. Used as an abrasive, and is a substitute for sandpaper and emery cloth or pumice stone; used in shipbuilding, in other building, in factories and in the household. No figures of production are available. L. W. MOFFETT, *Iron Age*, 9-7-22, 1500 w. CJW.

Nonferrous Alloys. Review of progress in 1921. Discusses light aluminum and heavy aluminum alloys, brass and bronze, nickel, cobalt, zinc. Advances are being made in methods of chemical analysis, endurance testing, metallography, etching practice, and photomicroscopy. H. W. GILLETT, *J. Ind. Eng. Chem.*, 9-22, 2500 w. CJW.

Electrical Properties of Alloys. Materials used in the heating elements of commercial units may be divided into two classes. The first comprises those which require materials with high specific resistance at the operating temperature (various grades of nickel, alloys of copper and nickel, iron and nickel, etc.). The second includes those materials which in addition to having a high specific resistance unit must also withstand oxidation (various grades of nichrome). The first class can be operated successfully at temperatures not exceeding 500°C, the second may be used up to 1100°C. It will be possible from the data contained in this paper to calculate the specific resistance of any material in either class at any operating temperature. M. A. HUNTER and A. JONES, *Trans. Am. Electrochem. Soc.*, 9-22, 20 pp. CJW.



(Magazine of Wall Street)

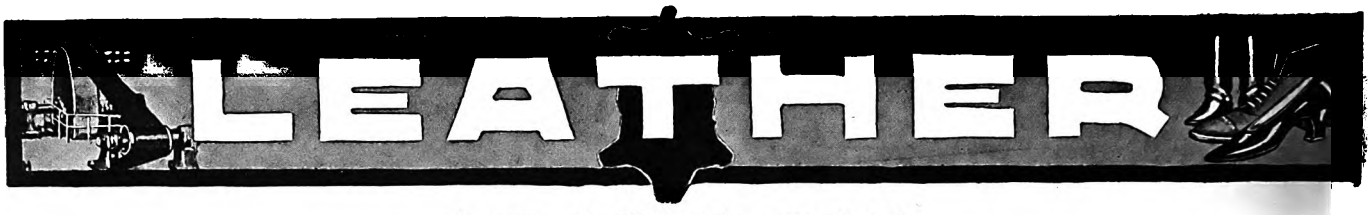
Average monthly silver prices since January, 1920.

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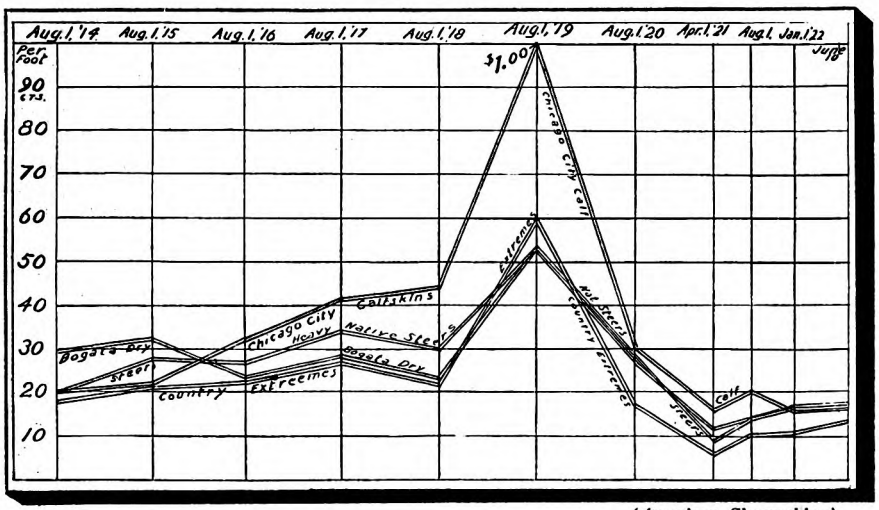


Advance in Shoe Prices Doubtful

ACCORDING to *American Shoemaking,* the leather market in general is quiet and tanners are beginning to realize that there is still available too much leather of one kind or another to place the market in a really strong position. The trend of hide values is shown in the graphic chart below. Buyers are operating in a hand-to-mouth manner, and the sale slips of tanners in many cases resemble a retail business.

Discussing the trend of shoe prices, *The Shoe Retailer* states that since the announcement of the adoption of the tariff bill, which carries hides, skins and shoes on the free list, there has been an overnight cessation of talk about still higher leather prices. It is pointed out that there have been many economies effected in production through lowering of overhead, lessened labor costs, and increased efficiency, which considerably offset the advance in the price of materials. Moreover, there is strong competition for business, merchants are comparing price and quality before buying, and shoe manufacturers know this is not the time to increase prices.

In the opinion of *The Shoe Retailer,* "Prices will be somewhat firmer but not needlessly higher, and there is every prospect that the process of a very gradual decline will continue over many seasons to come. Those who believe that a rise in prices is coming and that this is a thing that will tend to stimulate buying, are reckoning without the temper of the buying public. Keen discrimination still exists. The public wants value for its money and will get it."



(American Shoemaking)

Recent rise in hide values looks insignificant when compared with fluctuations of recent years.

Technical Problems of the Tanning Industry. A composite engineering view of the tanning industry for the purpose of directing the attention of the electrical engineer toward some of the more urgent requirements of this industry, which being primarily electrical, he is able to furnish. The engineering principles involved in the tanning of leather are discussed; typical manufacturing processes in the two main divisions of the industry are described. Some recent developments in the form of mechanical-electrical units, now coming into use, are also illustrated and described. Table of HP requirements for the individual machine operations is given. W. E. BROUGHTON and J. J. BROPHY, *J. Am. Inst. Elect. Engrs.,* 9-22. IG.

Vegetable Tanning. Review of recent work. Outstanding chemical feature is synthesis of gallotannic acid by Emil Fischer. Recent classification of tannins divides them into hydrolyzable tannins, in which benzene nuclei are united to larger complexes through oxygen atoms; condensed tannins, in which the nuclei are held together through carbon linkages. Studies of fixation of tannins by pelt. Syntans have received considerable attention. They are condensation products of formaldehyde with sulfonated cresols and other aromatic compounds. A. W. THOMAS, *J. Ind. Eng. Chem.,* 9-22, 2750 w. CJW.

When Shoe "Looks" Right. This article is intended to wake up men in charge in shoe manufacturing industry, to increase desire of those who have charge of employees to study a shoe—to study it with an idea of increasing their store of knowledge, so that they will not only know when a shoe "looks right," but know how to make it "look right." With such knowledge in the heads of executives, it is fair to assume that the rank and file of the factory and the selling force will be bettered by contact with such head men, and, of course, the business will be improved, too. *American Shoemaking,* 9-6-22, 500 w. CJW.

Systems of Ash Discharge. A description of various systems of ash discharge as applied to underfeed stoker practice. D. C. SPENCER, *Central Station,* 9-22. IG.

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Mineral Tannages. Review of recent work, especially one-bath chrome liquors. Acidity and neutral salts, concentration effects and violet and green chrome solutions are considered. Little work has been done on the two-bath tannage. Theory of chrome tannage still obscure. Iron tannage is still in early experimental stages. F. L. SEYMOUR-JONES, *J. Ind. Eng. Chem.,* 9-22, 2500 w CJW.

Drapes and Coverings. To sell coverings used on furniture intelligently, salesman should possess certain knowledge of leather and its substitutes. Most imitation leather consists of some textile base like heavy muslin or sateen coated with gelatinous compound containing resin, tannin and at times aluminum acetate. Pyroxlin coated with lanolin used for artificial leather for trimmings, couch coverings, chair work, etc. Description of process of manufacture of genuine leather from skins of cow, pig, horse, seal, sheep, etc. Process of fleshing, currying, and tanning explained in general terms. Velours, taps, poplins and other materials also discussed in same general way. B. J. MUNCHWEILER, *Grand Rapids Furniture Record,* 9-22, 2500 w. CJW.

New Tanning Process. Tanning leather is a time-consuming process. Many attempts have been made to circumvent this difficulty, but nearly all rapid tanning processes have been productive of inferior leather, due to the destructive action of the tanning agent on the hides under the condition of rapid tanning. A new process has been developed in Canada, which bids fair to revolutionize the tanning industry. The hides are placed in hermetically sealed tanks and a vacuum is established therein. The solution of tannin is then added. Previously, however, the tanning agent has been treated to remove all the oxygen that it may contain. The tan liquor penetrates immediately into the open pores of the hides, permeates rapidly the entire mass and exerts its action quickly, so that the entire tanning operation, instead of lasting weeks, takes but six days for completion. Furthermore, the leather is generally considered to be of better quality, as the tan liquor does not injure the hides. IG.

MINING

Mining Outlook Much Improved

A BELIEF that the mining industry of the West is entering upon a period of prosperity was general among the 84 men, representing 11 of the Rocky Mountain and Pacific Coast mining States, who attended the Western mining conference in Denver recently. *The Arizona Mining Journal* reports that the prospects for the profitable mining of zinc, lead and manganese are especially favorable.

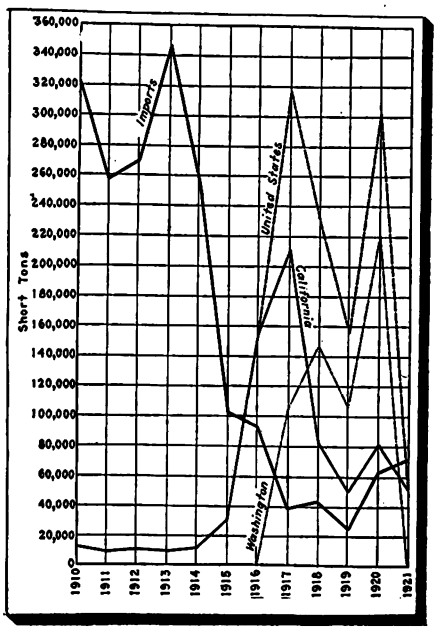
Gold and silver operators in Arizona, Colorado and California are said to be engaged in extensive exploration work. Plans are being discussed by large operators in North and South America for forming an organization of prominent operators. The purpose of this organization will be to control a large percentage of the world's output of silver so that this metal will not be dependent upon the mercy of the world's markets after the purchases provided for under the Pittman act have been made. This, it is believed, is a constructive move toward the stabilization of silver, and belief in its effectiveness has already had its effect on silver mining. A stabilization of silver, and the effect upon the credits of those countries of the Orient using silver as standard, will increase the demand for and the possibility of purchases of all the other minerals.

Rossland Ores. Rossland ores consist essentially of small percentages of chalcopyrite, accompanied by large excess of pyrrhotite in heavy gangue of altered country, consisting largely of augite porphyrite. Milling scheme must therefore deal with comparative coarse aggregation as well as a fine dissemination of mineral. Milling history is given. Large proportion of the gold exists free and it is possible to make gold recoveries independent of sulfide recoveries. Flotation adopted, using water gas tar added in secondary ball mill at rate of 1 lb. per ton of ore and heavy pine oil, added in the pachuca at the rate of ¼ lb. per ton of ore. Total quantity of reagents will not exceed 1.5 lbs. and the cost was between 7 and 8 cents per ton. Milling at the rate of 2500 tons monthly, following costs were obtained: cost of delivery to mills, $0.40 per ton; cost of milling, $1.60 per ton. DOUGLAS LAY, *Canadian Mining J.*, 8-25-22, 2000 w. CJW.

Mining Methods in Nova Scotia. This paper describes mining methods in slope mine having depth of 6900 ft., the dip of the slope being 38° to 20°. Thickness of coal worked is 9 ft. The original method of working was to divide coal into pillars on first working. As levels advanced, headings spaced 700 ft. apart were driven on full pitch of the seam. Boards were then driven through pillar until it was completely divided up. The pillars were then drawn, working toward the slope. The problem of "bumping" caused this system to be modified. It was found that bumps were much more frequent with large pillars than with small ones. Due to considerable depth of cover over coal, it is very important that pillars be removed quickly. The haulage system on the inclines is also described. J. C. NICHOLSON, *Coal Industry*, 8-22, 1600 w. CJW.

Present Values. Present value of mining property dependent on several closely related factors, most important being ore reserve, plant capacity and operating profits per ton. Increase in ore reserves, after large tonnage has been developed, means very little increase in present value, unless plant capacity is also increased. Increase in plant capacity and consequent shortening of life and increase in annual profits has very marked effect on present value. Average grade of ore mined has very important bearing and should be given careful study. Dilution of ore by admixture of waste from capping or from walls may greatly reduce present value. Reduced operating costs per ton should mean increased profits and higher present value, but not always case. Present value of mine of great importance when planning for operation of property, particularly in case of large mine, but mere calculation of present value based on estimated ore reserve, profit per ton and plant capacity may lead to grave errors, unless careful and intelligent judgment is used in connection with each calculation. EDWIN S. BERRY, *Mining and Metallurgy*, 7-22, 4000 w. CJW.

Magnesite. Little known but important metallic mineral. Principal uses are as refractory lining for metallurgical furnaces and as plastic material for floors and walls of buildings. Dead-burned magnesite or refractory calcines better known and most used. Caustic calcined magnesite used for manufacture of oxychloride or Sorel cement. Chief markets for dead-burned magnesite are steel plants between Baltimore and Chicago, and for caustic magnesite larger cities of Eastern U. S. and Pacific Coast. Consuption approximates 300,000 short tons annually. Chemical and physical requirements variable. Usually shipped only in car lots; crude shipped in lump form, in box or open-top cars. Plastic calcined magnesite shipped in paper bags, paper-lined burlap sacks or paper-lined barrels. Less than 20 years' suply in Washington and California at 1920 production rate. Standards developed for plastic calcines. R. W. STONE, *Eng. Min. J.-Press*, 7-29-22, 3500 w. CJW.



Magnesite production of Washington, California and the United States, and imports 1910 to 1921. See "Magnesite" digest above.

Geophone in Mining. Geophone promises to become active factor in saving of lives of miners entombed as result of fires and explosions. It is sensitive, yet extremely simple and easily portable. Consists of lead weight suspended between two elastic diaphragms cutting across small air tight box. If instrument is placed on ground and anyone is pounding or digging in vicinity, energy is transmitted as wave motion of earth and earth waves shake geophone case. By its use possible to locate approximate position of entombed miners, to detect location of leaks in water pipes, location of mine fires; they furnish quick and fairly accurate method of mine surveying, and will prevent accidents in blasting through when two tunnels are approaching each other. Bureau of Mines, *Technical Paper 277* (1922). CJW.

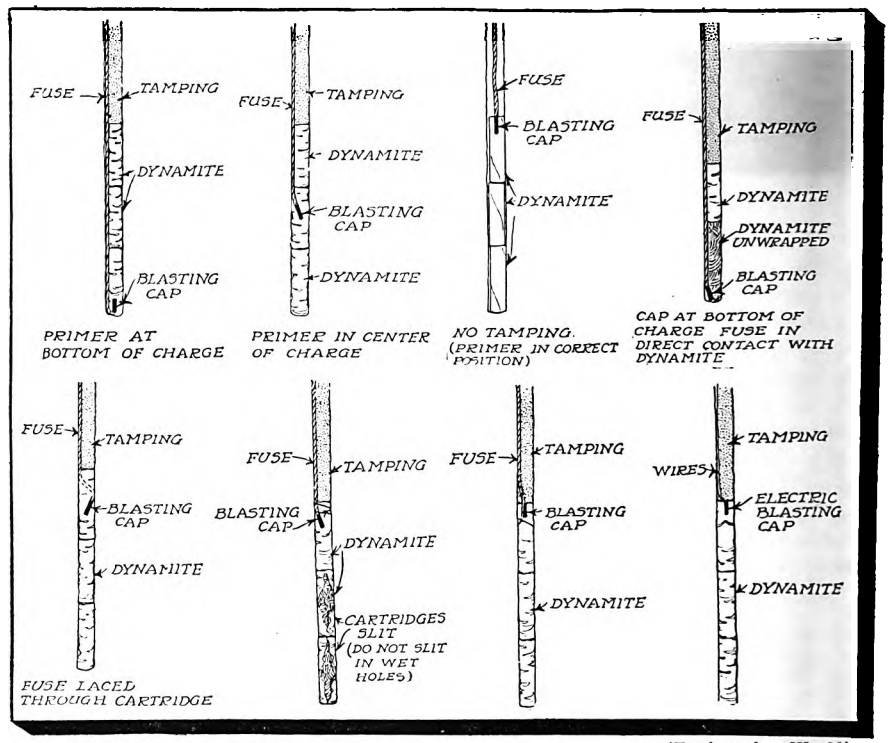
Shaft Bottom Layouts. This means the excavation made directly around shaft for purpose of handling output from mine, and ventilation purposes. Should consider acreage of property, tonnage per working day expected to be handled, depth from surface, whether reservations are to be made for surface buildings about surface top, whether mine is expected to become gaseous, and whether large volumes of air must be forced throughout the mine. Five layouts are shown in diagrams. R. Z. VIRGIN, *Coal Trade Bull.*, 9-1-22, 750 w. CJW.

J. E. Tiffany, assistant explosives engineer of the Bureau of Mines, now in Europe, has been authorized by the Secretary of the Interior to inspect the mining and explosives experimental stations of England, in order to compare their methods of testing with those used in the United States. Mr. Tiffany will also study the use of permitted explosives in British coal mines.—*Bureau of Mines Bull.*

Comminuted Smokeless Powder as a Blasting Agent. Tests showed that comminuted smokeless powder can be used for certain blasting purposes, especially in blasting stumps, boulders and ditches. As gaseous products of detonation include poisonous and inflammable carbon monoxide, comminuted smokeless powder is unsuitable for use as explosive in dusty and gaseous coal mines or in other places where inflammable dust, gases or vapors may be encountered. Nor should it be used in mines, tunnels or other close places, unless the ventilation is very good and workmen are not in contact with the poisonous gases produced by it. Comminuted smokeless powder is ignited easily and burns, but is detonated most effectively not by a fuse but by a No. 6 electric detonator. This powder proved to be sensitive both to percussion and friction; it is much less sensitive to percussion than 40% straight dynamite, is more sensitive than dry picric acid, and about as sensitive as nitroglycerin and gelatin dynamites. As to propulsive capacity, comminuted smokeless powder rated highest of the explosives tested, except dry picric acid. The rate of detonation —which is the measure of its shattering power—was about 6% lower than the standard used, though it was the lowest of the explosives tested. The primary charge must be dry; an adequate quantity of stemming should be used in the bore holes and should be well tamped. Comminuted smokeless powder is unsuitable for propagated blasting. C. E. MUNROE and S. P. HOWELL, Bureau of Mines, Reports of Investigations, No. 2386, 8-22, 19 pp. CJW.

Safety Methods in Coal Mining. Following suggestions offered by Bureau of Mines: All persons in responsible charge of direct operation of coal mines should be required to have certificates of competency issued by State, showing that applicant has passed examination clearly establishing his knowledge of what constitutes up-to-date safe practices in branch or branches of mine operations under his jurisdiction. Mining companies should require superintendents, foremen, fire bosses and shotfirers, to keep thoroughly familiar with requirements of State laws, as well as with up-to-date practices in regard to ventilation, dust, electricity in mines and explosives. Each mine should make especial study of its gas and dust conditions. Advisable to enlist services of U. S. Bureau of Mines. D. HARRINGTON, Reports of Investigations, Bureau of Mines, No. 2372 (1922), 2 pp. CJW.

Sampling and Estimating Iron Ores. Drifts and cross-cuts in iron ore deposits are usually sampled in 20- or 25-ft. sections. Each section is sampled at four stations. Grooves are cut between each set of timbers, 5-ft. intervals on opposite sides of drift. Material is caught in pan and proper amount is taken, after mixing for sample. In all estimates main factor influencing results is personal element, good judgment. Problem of structural geology combined with



(Engineering World)

Right and wrong ways for placing charge of dynamite for blasting.

Reading left to right—(1) One Wrong Way: For instance, the cap with fuse should not be placed at the bottom of the hole like this, as the side spit of the fuse would be likely to set fire to the dynamite. (2) Another Wrong Way: Even the middle of the charge is not the right place to put the primer, as the top cartridge does not receive the full force of the cap and the fuse may ignite the powder that touches it. (3) Another Wrong Way: This kind of loading, without tamping is expensive and inefficient, as the top cartridge wastes most of its force blowing out the hole. The Bureau of Mines reports that tamping increases the effectiveness of high explosives enormously. (4) Another Wrong Way: This is also bad practice, as the cap is pointed away from the charge instead of toward it and the fuse is also likely to set fire to the dynamite before the cap explodes. (5) Another Wrong Way: Lacing the fuse through the priming cartridge is bad practice. It nearly always lets the fuse side spit into the dynamite. (6) Another Wrong Way: If the holes are full of water the cartridges of dynamite should not be slit, as water affects nearly every kind of dynamite except gelatin. (7) The Right Way: This way, with the cap in the top of the top cartridge, pointing down toward the bulk of the charge, with lots of tamping and no part of the fuse touching the powder will give you a perfect shot every time. (8) Another Right Way: Or even if you fire electrically, you will get best results this way, as the electric blasting cap is placed so as to exert its maximum detonating effect on all the explosive in the charge.

engineering accuracy. Two methods are average depth and area method and cross section method, with application of "end area" formula. Discussion of these methods. Empirical rules used in various fields given. Most common classification of Lake Superior ores are: Standard, washable, lean, non-washable ores and manganiferous iron ores. All ores over 49%-50% dry iron are standard. Quality of ore of each class of grade in orebody is computed by foot-unit method. Density may vary and tests should be made in great many different parts and different structural layers of orebody. In some cases may use moisture of saturation method. J. F. WOLF, *Mining & Metallurgy*, 9-22, 3500 w. CJW.

Dust and Ventilation in Metal Mines. Summary of results with bibliography. Worst condition seems to be hot, humid stagnant air that is impregnated with finely divided dust from quartz or other rock composed largely of free silica. Where comparatively cool, but stagnant, air is impregnated with finely divided dust, largely of free silica composition. Underground man works at maximum capacity, thus breathing a maximum quantity of dust, and he becomes incapacitated within comparatively few years. Probably any finely divided, insoluble dust—including that of coal—breathed in large quantities for continuous periods of time will ultimately result in bronchitis, miners' asthma, lead poisoning or miners' consumption, or will predispose workers to pneumonia or tuberculosis. Questions to be solved are why one dust is more harmful than another, why dust of certain chemical or mineralogical composition is harmful in one locality and relatively harmless in another, best practical measures to avoid ill effects of harmful dusts, how best to cause air to circulate with maximum efficiency and minimum cost to places where metal miners work, quantities of air necessary under varying conditions, and physiological effects due to various kinds of gases, degrees of air vitiation, and range of temperature and humidity. D. HARRINGTON, Bureau of Mines, Reports of Investigations, No. 2374, 6 pp, 7-22. CJW.

An air-operated hand-pick for miners has been invented by a German. It is used in spaces too small for the swinging pick.—*Dearborn Independent.*

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Big Dividends for Oil Companies

THE Standard Oil companies have been providing excitement to the oil trade and the financial markets by declaring large stock dividends. For a long time it has been rumored that these corporations were about to cut melons, and the predictions have come true. Standard of California declared a 100% stock dividend early in the first week of October, and the New York company followed a few days later with a 200% dividend. Earlier in the year the Standard Oil Company of Kentucky not only declared a 33⅓% stock dividend, but also permitted shareholders to subscribe to additional new stock at par up to 33⅓% of their holdings, and then reduced the par value of shares from $100 to $25.

Virtually all of the Standard Oil corporations have been making big money during the past decade, and until now the capitalization of many of them has not reflected the increase in their worth. In the 11 years in independent operation of the companies a total of $1,000,000,000 has been paid to the stockholders in cash dividends, and an additional $1,000,000,000 of stock dividends has been declared. But apparently there is a lot more to come from the same source. The balance sheets of most of the companies show great surpluses.

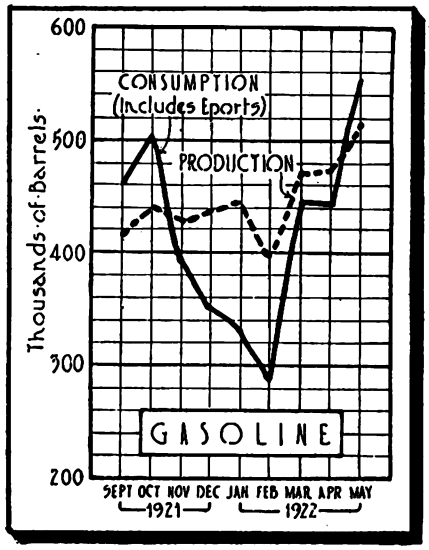
The companies now most frequently mentioned as about to declare stock dividends are the Atlantic Refining Co., the Ohio Oil Co., the Prairie Oil and Gas Co., the Solar Refining Co., Standard Oil of Indiana, Standard of Kansas, Standard of New Jersey, Standard of Ohio, and the Vacuum Oil Co.

Water Conditions in Mexia, Texas, Oil Fields. The work so far performed by the U. S. Bureau of Mines in its investigations of water conditions in the Mexia oil fields in Texas has shown that the encroachment of edge water has progressed further up the dip on the lowest pay sand than it has on the two or more upper pays. It has been shown that water analyses can be used to advantage for determining source. The lower or highly mineralized water is practically proved to be largely from an edge rather than a bottom source. The probable proportion of top and edge water in the production of the area is as yet indeterminate, but it is certain that there is considerable top water. Some of the idle or abandoned wells are most likely allowing water to enter the oil sands. It has been recommended that accurate figures for production of oil, water and emulsion by individual wells be obtained and also temperature readings, fluid levels and water analyses for the wells making the most water.

Oil Shale. Oil shales of New Albany, Ind., district should yield from 6 to 14 gal. oil per ton, much less than average yield from Western shale, but oil will apparently yield higher percentage of motor fuel than many Western shales. Under different retorting conditions amount of gas obtained varied from 500 to 1800 cubic feet per ton of shale, with average heating value of 750 BTU per cubic foot. Percentage of hydrogen sulfide gas is unusually high. May be an important source of ammonium sulfate but should not be considered commercial source of potash. Bureau of Mines considers that future of oil-shale industry in this country depends upon relative supply and demand for petroleum products, particularly in Rocky Mountain district. JOHN R. REEVES, *Bureau of Mines, Reports of Investigations,* No. 2390, 8-22, 8 pp. CJW.

Mexican Blends of Fuel Oil. Mexican oils offer difficulty in burning because of extremely high viscocity, rapid carbonization at tips, temperature necessary to keep oil relatively thin, lack of heat conductivity and high sulfur content. It is now found that blending of this oil with Pine Island crude of Louisiana gives a homogeneous mixture (in proportions of 50-50, 40-60, 30-70) which burned with most excellent results. Small deposit of asphaltic material which settles out on standing is of minor importance, because it will not be pumped out with the oil. New blend does not require heating to excessive temperatures to maintain viscosity necessary for efficient atomization, deposit of carbon is not excessive, pumps maintain their capacities at ordinary temperatures and heat conductivity is greater than of original crude. R. C. BRIERLY, *Combustion,* 9-22, 2000 w. CJW.

Oil Plant Fires. Review of recent disastrous oil plant fires. Wooden roof on oil tanks real hazard. Should use gastight steel roofs, properly vented. Except where tanks are great distance apart, dikes or embankments high enough to retain one and one-half times the contents of the enclosed tanks are desirable. Desirable to study direction of prevailing winds in building tanks. Blow should be across narrow part of plant instead of down its length. *National Petroleum News,* 9-6-22, 1500 w. CJW.



(Magazine of Wall Street)
Consumption of gasoline once again is in excess of production.

Dilution. Dilution of motor oil is caused by cracking or decomposition of lubricating oil being thrown against hot surfaces of engine, direct leakage of unvaporized fuel entering manifold and cylinders as raw gasoline, and forcing down past piston rings of portion of air and gasoline mixture under pressure during compression stroke. Average dilution 30% in cold weather and 15% in hot weather. Practical effects are noticeable in increased consumption of lubricating oil and consequent prevalence of carbon trouble. Also causes increase in engine resistance due to solid friction from metal-to-metal contact of moving parts. Wear increases at rapid rate with dilution of oils. In last analysis dilution condition means that we are not able to properly lubricate the engine. If solution is not found, this lack of lubrication may mean that present type of engine will have to be discontinued for type that will allow of constant and efficient lubrication without contamination of lubricating oil by fuel, which machine of this nature requires for economical and successful operation. W. F. PARISH, *Petroleum World,* 8-22, 2000 w. CJW.

Gasoline in Paraffin Crude. It is shown that by the use of the tower laboratory method (use of Hempel tube filled with glass beads) 40% of 58.5° Be gasoline may be obtained from a crude which, tested ordinarily, gave only 35.5%, and that the product was sweet with both the "doctor" and doctor plus sulfur, whereas the previous product showed a trace of "sour" with doctor and "sour" when sulfur was added. Plant recovery figures are given to show that if all crude still products are towered, the same yield may be obtained, which, based on average run of 45,000 barrels per month, means an additional revenue of $13,260. T. B. LEECH, *National Petroleum News,* 8-30-22, 1200 w. CJW.

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Higher Paper Prices Probable

THE official organ of the Paper and Pulp Association believes that the outlook is very promising for continued and increasing good business in fine paper for the rest of the year and the early part of 1923. "The question of costs, however, has become very pertinent. Raw materials are advancing every week and many of the mills are facing all kinds of contingencies with the expense and scarcity of fuel, with shutdowns which are costly, and with production and distribution difficulties."

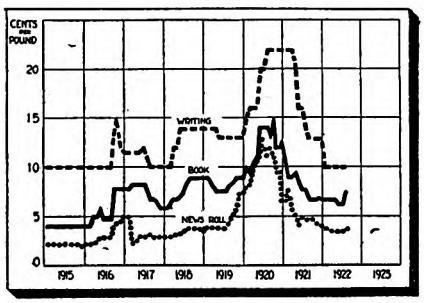
There is no doubt that during the last month of the coal strike some mills were seriously handicapped by a shortage of fuel. The average coal prices for paper mills are still more than 50% over the prices paid before the strike. Inasmuch as the average consumption of coal in the paper industry is 1.3 tons of coal to every ton of paper, the high coal prices are greatly increasing the cost of production.

The *Standard Daily Trade Service* predicts that most paper prices are likely to increase, due to the fact that stocks are under normal and mills are curtailing production because of lack of coal. *The Harvard Economic Service,* in a recent article on the paper industry and the business cycle, stated that the immediate outlook is for stiffening demand and rising prices. The range of prices in the 7½ years is shown in the accompanying chart.

Wood and Cotton Cellulose. Wood cellulose most nearly corresponding to cotton, taking purified linters as standard, is obtained by recooking "easy bleaching" sulfite pulp with soda and bleaching with 2% bleach. Recooked, raw cooked sulfite pulp bleached with 3% bleach does not differ so markedly from above sample and represents 6% higher yield on basis of original wood. From chemical point, pulps produced by alkali are less similar to cotton than those produced by acid cooking or by acid and alkaline cooking. Since bleaching appears to be very efficient method of removing noncellulose material it is probable that yield of cellulose suitable for manufacture of esters could be materially increased by giving a light or raw cooked stock a bleaching treatment prior to recooking with soda. Cellulose from wood and that from cotton do not appear to represent identical chemical aggregates and same is true of wood celluloses obtained by acid cooking and by alkaline cooking. Practice of checking wood cellulose according to specifications for cotton is therefore questionable procedure. S. A. MAHOOD and D. E. CABLE, *J. Ind. Eng. Chem.,* 8-22, 4000 w. CJW.

Pulp and Paper. Recent advances in pulp and paper industry are discussed under headings of raw materials, improvements in processes, analytical methods, beating, bleaching, sizing. C. J. WEST, *J. Ind. Eng. Chem.,* 9-22,

Pulpwood on Pacific Coast. Western species particularly adapted to manufacture of mechanical and chemical pulps are: Alpine fir, white fir, amabilis fir, lowland fir, Engleman spruce, lodgepole pine, Sitka spruce, western hemlock, red fir, noble fir, western yellow pine and western larch. Alpine fir is lighter in color than spruce. White fir is best when young trees are used. Empleman spruce gives pulp of excellent strength and color. Sitka spruce has longest fibers of any American spruces. Larch makes poorest pulp, and is best worked by steaming before grinding. Most of these woods are too valuable for mechanical and sulphite pulps to be converted into sulphate pulps. Western larch unique in centent of galactan, which yields galactose on hydrolysis and mucic acid on oxidation. Galactan can



(Federal Reserve Bank, Phila.)

The course of paper prices since 1915. Writing paper alone maintained the peak prices of 1920 into 1921, but it also is the only grade that has reacted to the 1915 level.

be cheaply recovered from butts of larch and converted into chemical products. Before cooking chips with sulphate, should be extracted with water on counter-current principle. A. W. SCHORGER, *Paper Trade J.,* 8-3-22, 2000 w. CJW.

Felt Troubles. Real trouble in many cases is with careless or ignorant employes, through lack of careful handling in putting felt on machine and starting it. Stretching and consequent narrowing of felts seems to be about hardest problem for felt maker. Best way to avoid felt troubles in general is to always keep wet end of machine in repair, keeping cylinder bearings lubricated, collars not too high, couch and roll bearings babbited and oiled, press bearings in good shape, suction box covers and slices smooth, worms on felt rolls without nailheads sticking up and whippers examined regularly. R. CLAYTON, *Boxboard,* 8-22, 500 w. CJW.

Safety in Beater Room. Question is largely that of individual involved. Hazards are not extreme, nor are they numerous, and, with ordinary careful men who exercise normal judgment in doing their work, department should be able to show safety record at end of year comparable with any department of mill. Various possible causes of accidents are discussed. F. A. DRUMB, *Paper Industry,* 8-22, 1400 w. CJW.

Easy Practical Tests. Phloroglucinol test used for groundwork, red color resulting. Aniline sulfate will give a deep yellow. Grain in book paper determined by tearing sheet, noting curl of small circle in palm of hand (curl parallel to machine direction), or by observing lines of rupture on Mullen tester. Rosin sizing can be determined by dropping ether on paper, which, on drying, will leave brown ring at edges of ether, or by adding drop of concentrated dulfuric acid and few crystals of sugar, which give raspberry red color. Starch is detected by iodine-potassium iodide solution, giving a blue color. Casein can be detected by odor. Silver coin will make a black mark. Other fillers best determined in laboratory. Opacity determined by laying sheets of paper over hole in cardboard in front of light. Test for coating consists in pressing moistened thumb on surface of paper; if coating without fibers adheres to skin, coating is weak. If moistened sheet is run over black cloth and coating shows up white, sheet is not waterproof. Other tests, for finish, cleanliness, etc., are also given. N. A. ALTMANN, *Pulp Paper Mag.,* 7-21-22, 1200 w. CJW.

Couch Roll Jackets. Two main objects are to transfer paper from Fourdrinier wire to felt and to squeeze out as much water as possible in process. Because pressure is applied to top roll, jacket must be strong and firm. News and similar fast-running machines use 5x jacket, while with finer grades 3x and 4x jackets are used. In most mills today only top roll is jacketed. Jackets are woven in tubular form, and in sufficient length to allow several jackets in same diameter to be cut from one piece. In finishing all jackets are fulled to somewhat smaller diameter than diameter of roll on which they are to be used. Stretched while wet to size that allows them to be slipped over roll. Guard board has more to do with length of service of jacket than any other one thing. Pitch from jack pine will shorten life unless washed off with proper care. J. C. STANDISH, Alfleco facts, 1, no. 4 (1922), 500 w. CJW.

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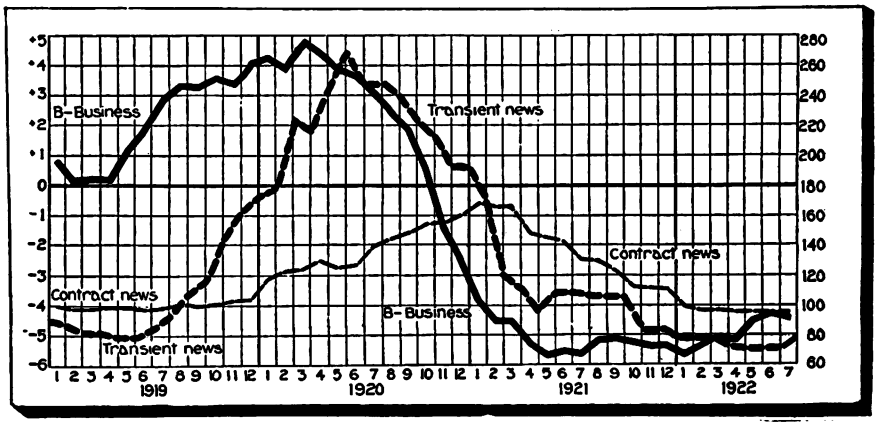
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Filter Paper. Problem in filter paper manufacture is to reach maximum penetrability and at same time secure thorough retention of solids which are filtered and primary requisite, reduction of mineral constituents of ash in paper. Also includes speed in filtration and good appearance. Stock used is highest grade of new white cotton rags. Thickness of paper is between 0.007 and 0.008 in. Bursting strength is about 15 lbs. per sq. in. Manufacturing process discussed. Methods of testing filter paper. L. C. BREED, *Paper*, 8-16-22, 500 w. CJW.

Surface Treated Papers. A general discussion of various surface-treated papers, including photographic, chromo, art printing, stained, metallic coated velour; manufacture is discussed, including treatment of cellulose in kollergang, on paper machine, dyeing, etc. Wood pulp, which is as free from ash as possible, made from logs which are not too old, but which are freshly cut and almost free from bark should be used. Only artificial stones are used in grinding. Old paper may be used to certain extent. Formation of froth in diluted paper stock must be prevented. Kaolin, stain white or blanc fixe are used, according to quality desired in finished paper. Surface treating machines important link in process. *Paper Trade J.*, 8-24-22, 3000 w. CJW.

Bursting Strength of Paper. Study of the variation in results on bursting strength of paper. When tester is carefully adjusted and operated by same person under identical conditions on paper breaking from 10 to 130 points, difference between average of five breaks on same machine is two points or less in about 80% of the instances. Larger differences occur usually with papers having high bursting strengths. The differences between averages of 10 breaks on same tester are two points or less in about 90% of the instances. Between averages of 10 tests on different machines a difference of between two and three points occurred in 6% of the cases. Results indicate that 10 tests should always be made, but two testers or two gages on the same tester should not be used. Bursting strength of sheet of paper varies much more than does reading of several gages on same break. E. O. REED and F. P. VEITCH, *Paper Trade J.*, 7-20-22, 3000 w. CJW.

Herzberg Stain. After careful analysis of stain as used by different investigators, following formula and procedure are adopted standard: *Solution A*—50 g. of dry zinc chloride (fused sticks), 25 cc. distilled water added with a 25 cc. pipette in the zinc chloride bottle, stoppered and shaken. Should be about 40 cc. of solution. Take the specific gravity at 28° C. If the specific gravity is not 1.8 add distilled water in 1 cc. pipette until the specific gravity is 1.8, then pour into a tall cylinder. *Solution B*—Take part of 12.5 cc. of the distilled water to rinse the thermometer, the hydrometer and original zinc chloride container and add to solution A. Dissolve 5.25 g. of potassium iodide and .25 g. of iodine in the balance of the water. Add B to A, stir well and place in the dark. The following day pipette off the clear portion into a black bottle, leaving 3 or 4 cc. of the solution above the sediment. Add a leaf of crystal iodine. This stain will be found to be satisfactory for at least two weeks if it is to be used for routine analysis where color differentiations are important. Weights and measures must be observed carefully as Herzberg advised in his directions. M. F. MERRITT, *Paper Trade J.*, 8-24-22, 1600 w. CJW.



(Harvard Economic Service)

Newsprint prices and the business curve, 1919-1922.

Retention of Dyes by Pulp. Study is made of effect of temperature and other factors upon four paper dyes. Basic dye (Victoria Blue B) retained with no appreciable loss up to concentration of 9.5 lbs. per 1000 lbs. bone dry fiber at room temperature, without addition of any chemical other than filler, size and alum. Acid (Pontacyl Blue Black Six) decreased in retention with increase of temperature. At concentrations of 4 lbs. and higher, direct saving is effected by excess of alum, an alum to rosin ratio of 2.4: 1 being most economical. Aluminium chloride increases retention but is more costly and less conveniently obtained than alum. Pontamine Brown R was retained by bleached sulphite up to a concentration of 12 lbs. Pontamine Yellow SX (direct) was retained up to a concentration of 6 lbs., but above this the loss in the back water may be decreased by addition of common salt. An elevated temperature is of no value. Data should be worked out for every dye used in each mill, as data are very scarce and even unreliable. H. A. BROWN and L. S. HATCH, *Paper Trade J.*, 8-10-22, 3000 w. CJW.

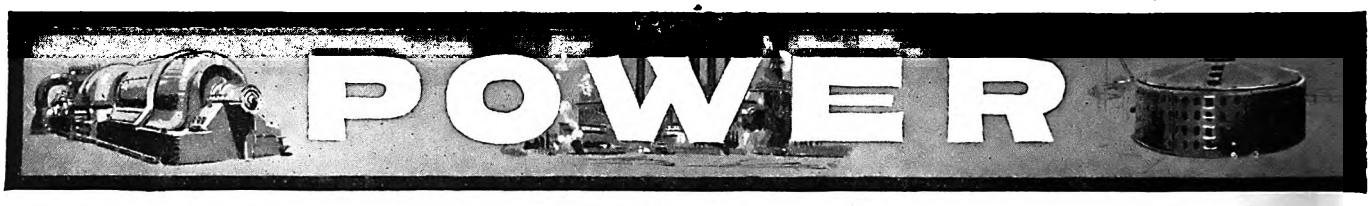
Rubber Latex. Directions are given for tests on small scale. Vessels containing latex must be kept sealed until used. Diluted latex should be sieved to remove dirt or particles of coagulated rubber. Advisable not to use over 300-lb. beatings at one time. To get good water-repellent paper with relatively small amount of rubber, ordinary sizing methods must be used as well. Contents of beater must be just faintly acid in reaction. F. KAYE, *Paper Trade J.*, 8-24-22, 500 w. CJW.

Causticizing in Presence of Silicate. Experiments have been made of action of slaked lime in excess at room temperature upon solutions of sodium carbonate plus sodium silicate. Most important variables were time and temperature. Under conditions which customarily result in high yield of caustic from carbonate alone, poor causticity was generally obtained when silicate was present. It was possible, however, to obtain 78% to 84% under conditions which yielded 92% to 94% for carbonate alone. Appears to be essential to have reaction time longer with carbonate-silicate mixture than with carbonate alone. Conclusion may be drawn that it is possible to obtain good causticization of soda solutions containing silicate even in large proportions by allowing sufficient time for reaction to go to completion. Further studies should be made. R. H. MCKEE and T. H. CHILTON, *Pulp Paper Mag.*, 8-17-22, 750 w. CJW.

Rosin Size Control. Method of estimating acidity of dilute solutions of rosin size. Test depends upon color change of thymolphthalein, which takes place only after the hydrogen ion concentration has reached definitely low figure. This method, at present time, is recommended chiefly for control purposes. It is believed that it will be of especial value when dealing with rosin size solutions containing considerable unsaponified rosin, and that in such cases it may be used to advantage as a supplement to a previously published control method, which estimated the alkaline properties of these solutions. P. W. CODWISE, *Paper*, 8-9-22, 1500 w. CJW.

Paper Standardization. Report of committee to Bureau of Standards regarding specifications of quality, testing of paper, sampling of paper for test and tolerances. Preliminary in nature, taking up those phases of these subjects on which agreement may be obtained at this time. Due to lack of attention to these subjects by paper industry, it is believed that these suggestions be considered tentative until criticisms have been received from larger group of paper manufacturers. Original report should be consulted for detailed recommendations. R. S. HATCH, *Paper Trade J.*, 8-14-22, 3000 w. CJW.

Pulp Sheet Mould. Standard pulp sheet mould designed to overcome irregularities in making small sheets of paper for test by fixing spread of fibers, suction and removal of sheet from mesh under standard conditions. Description of apparatus. May be used for study of numerous problems of industry. *Paper Mill*, 9-2-22, 1000 w. CJW.



Cooperative Consulting Engineers Needed

AMERICAN industries might profit by Europe's example in the matter of fuel economy, says *Power*. Many of the French industries, according to a recent report of the French Fuel Commission, have formed local steam users' associations, each having a laboratory and staff of supervising engineers, who analyze the coal, study operating records and render consulting service to the respective manufacturers in matters pertaining to greater fuel economy. Similar organizations are now functioning in Germany.

While it is true that Europe, as a result of local and post-war conditions, has been faced with the necessity of taking such measures earlier and to a greater extent than has seemed warranted in this country, the periodic disturbances in our coal supply, with accompanying high prices, make a more careful consideration of the question of full economy increasingly necessary.

Many of our large corporations having numerous and extensive plants have long had centralized power supervision within their own organizations, as have also central-stations. Moreover, some industries, through committees of their national associations, have attempted to exchange views and experiences in power matters. This method, however, does not reach the more intimate problems of everyday operation. Another difficulty is that the committee reports are usually presented but once a year. It is believed that local steam users' associations functioning along the lines of those in France and Germany would be especially helpful to the manufacturer whose business does not warrant the steady employment of a consulting power engineer, but whose share in maintaining an engineering staff in conjunction with other manufacturers would be nominal compared with the possible economies in power generation. Each would have the benefit of the others' experience—which gives the cooperating companies advantage over the concern that has its own consultant.

Abnormal Calls for Steam. Fuel bed area is not grate area. If this fire area is increased or decreased on same grate area, steam to be generated will be increased or decreased accordingly. This principle has been applied successfully through charging fuel beds in conical forms. Fire area is increased and fire projected from conical surfaces is more dense than that of horizontal surface of fuel bed. This means more calories per given section of flame and more intense heating of boiler furnace. Only change required in boiler installation is in combustion chamber, which has to be much larger than in ordinary feeding system and which varies with desirable height of cones and particular kind of fuel. Necessary to charge conic or high fuel beds with large size coal and lower beds with smaller sizes. Feeding will depend upon skill of fireman. ZUCE KOGAN, *Power Plant Eng.*, 9-15-22, 1000 w. CJW.

Stoker from Operating Viewpoint. Five things must be considered in contemplating station of any description: reliability, maintenance, efficiency, cost of operation and first cost. Efficient use of stoker depends upon limitations of design. Factors influencing this efficiency are discussed. Cost of operation influenced both by design and method of operation. Brief description of method of operation. Latest idea as to source of heat for feed water is to bleed heat from one or more of the stages of the main turbine in addition to what may be obtained from steam auxiliaries and house turbine sets. This is making installation of economizers harder to justify in large power plants. R. E. DILLON, *Combustion*, 9-22, 1500 w. CJW.

Modernizing Old Plants. An example is given of what may be accomplished by the investment of a comparatively small amount of money. Previous to undertaking a remodeling project of this nature, a thorough study should be made of existing equipment in order to determine which to discard and which to retain. It must be kept in mind that labor, these days, is an item of considerable expense and any method or machine which will reduce the labor cost should be given the preference. It may require the investment of a considerable outlay of capital, but the return due to savings effected will in most cases justify the investment. While first cost must be given due consideration at all times, it must be remembered that operating cost is the all-important factor governing profit and loss, and a judicious outlook of the proposition from this point of view will usually indicate the correct solution to any particular problem. *Power Plant Engineering*, 9-15-22, 2000 w. CJW.

Engine Bearing Lubrication. Engines below 100 hp. should use a red oil of 120-130" viscosity at 100° F.; between 100 and 250 hp. an oil of 175-200" viscosity and those between 250 and 500 hp. an oil of 250-300" viscosity. High-speed enclosed engines may be lubricated by forced-feed circulation or by splash oiling. Latter has advantage of low cost and simplicity, but oil becomes warm and contaminated with metallic particles from bearing wear dirt and moisture. Water or steam leakage from packing glands greatest drawback. Gravity feed circulation systems are also in common use. Oil used in circulating systems should be exactly same as that used in splash systems. Use of unsuitable oil means uncertainty of operation and high cost of renewals and repairs. R. B. WHITE, *Oil News*, 9-5-22, 750 w. CJW.

Erecting Oil Engine. General information, including method of pouring concrete foundation, leveling, setting engine, putting on flywheel, fitting exhaust pipes, fuel piping, cooling water system, and air compressor. As soon as engine is started, see that cooling water is running and lubricating oil supplying each part. Temperature of cooling water varies from 120 to 180°, depending on compression pressure and loads. Should see that rings do not stick. Two kinds of pounding—bearing pounds and combustion knocks. M. S. HOWARD, *Power Plant Eng.*, 9-15-22, 1600 w. CJW.

Steel Belts. Sandvik belt made of best Swedish charcoal steel, cold rolled, hardened, and tempered, possessing hard, smooth, and dense surface. Does not deteriorate when idle. Fact that stresses due to initial tension and pull are nominal compared to bending stresses accounts for possibility of making conveyors perforated without influencing life of belt. Rolled in widths up to 16 inches, one-piece lengths up to 350 ft., and thickness up to 0.04 in. Longitudinal edges are rounded and smooth. Compared with rubber belt, steel belt possesses greater transverse rigidity and therefore higher capacity. Speed varies between 135 and 300 ft. per min., with average of 200 ft. Special feature is ease and simplicity with which material can be discharged at any desired point along conveyor. Drive can be arranged at head or tail unit to suit conditions. Average incline is 1 in 4, though if terminal unloading only is to be used this may be increased to 1 to 2.75. H. CARLSON, *Paper Trade Jour.*, 9-14-22, 1500 w. CJW.

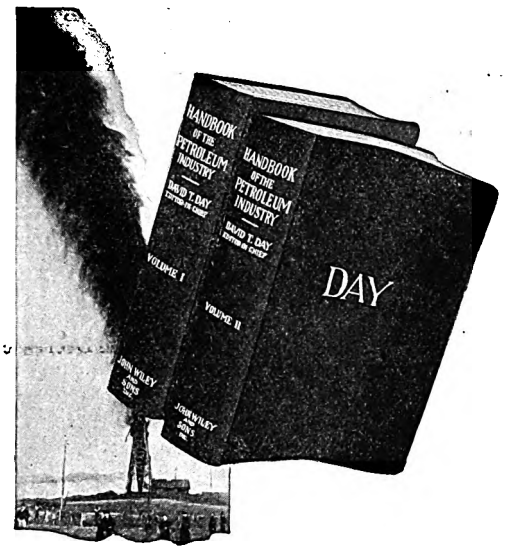
Exhaust and Scavenger Systems in Two-Cycle Oil Engines. This is a type of article in which the author makes a set of figures according to an empirical formula, and then gives for comparative purposes, similar actual figures for three different types of well-known engines. He advocates the use of the time-area principle in proportioning ports or scavenge valves. DAVID BRUCE, *Motorship*, 9-22, 3300 w. MAH.

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Tire Price Deflation

SINCE the rubber industry felt the effects of the present post-war depression more quickly and more severely than many other lines of business, the recovery of activities in the manufacture of rubber products, and especially of tires, is of greater significance. According to *The India Rubber World,* the tire demand of the present season compares favorably with that of the best months of 1920 and the factory output of tires for September has approached or equaled that of August.

The graphic chart covers seven and one-half years, from six months previous to the outbreak of the World War to the present, and exhibits the fluctuations of consumers' prices on two sizes of standard cord and fabric tires.

The following figures show the increase and decrease of tire prices:

INCREASE AND DECREASE OF TIRE PRICES

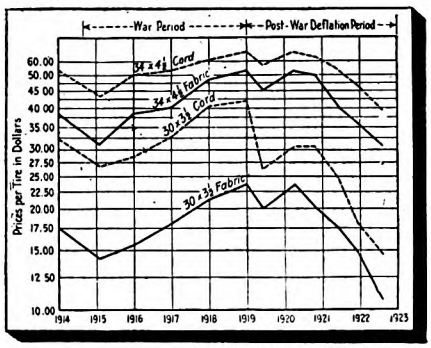
	Percentage Tire Price Increase Over Pre-War Level During War Sizes		Percentage Tire Price Decrease Below Pre-War Level During Deflation Sizes	
Kind of Tire	30 x 3½ Per Cent	34 x 4½ Per Cent	30 x 3½ Per Cent	34 x 4½ Per Cent
Fabric	27.75	29.00	42.00	20.25
Cord	38.00	26.75	54.50	25.50

Physics of Rubber. General discussion of physical structure, mechanical properties (stress-strain curve, energy relationships, volume changes, grain effect of compounding ingredients, measurement of particle size, etc.). Need of further work, both theoretical and practical. W. B. WIEGAND, *J. Ind. Eng. Chem.,* 9-22, 2000 w. CJW.

Rubber Compounding. In vulcanizing two factors work in opposite directions. Deploymerization, tending to weaken or deteriorate final product, is influenced by temperature and by type of accelerator employed. Sulfur addition counteracts these effects. Sulfur is principal deploymerizer. Shorter cures at moderate temperatures are desirable because of increased service and durability of product. Compounder is limited by slow heat flow in stocks and fabricated articles. Practical procedure in compounding. Influence of fillers. Activity of fillers tied up with fineness of division and constitution of particle surface. C. O. NORTH, *J. Ind. Eng. Chem.,* 9-22, 3000 w. CWJ.

Tests with Zinc Oxide and Litharge Mixtures. Taking proportionality in rate of cure as modified by addition of zinc oxide to ordinary rubber-sulfur mixing, and addition of litharge and reduction in the proportion of sulfur, zinc oxide produces some modification mainly in regard to the coefficients, but specimens fall into approximately same order as in the rubber-sulfur mixings. Litharge produces considerable modification and this applies both to the coefficients and elongation and the specimens do not fall into same order as in rubber-sulfur mixings. The simple rubber-sulfur mixings are the most sensitive to change in nature or proportion of coagulant. Addition of small proportion of zinc oxide (5%) modifies the results and reduces differences shown and litharge acts similarly, but more powerfully. H. P. STEVENS, *India Rubber World,* 9-1-22, 1000 w. CJW.

Rubber Vulcanization. Hexamethylenetetramine, p-nitrosodimethylaniline aldehyde ammonia and thiocarbanilide, respectively, have been introduced in such quantities in a mixing consisting of 48 parts of first latex crepe, 48 parts of zinc oxide and 3 parts of sulfur that



(India Rubber World)

Effect of war and deflation on standard cord and fabric tire prices.

equivalent physical states of cure have been obtained when vulcanized for 60 min. at 287° F. The amounts of these accelerators required to give equivalent physical states of cure were 0.5 part, 0.25 part, 0.75 part and 1.5 part, respectively. The vulcanization coefficient of these matched 60-min. cures, which were 0.87, 1.03, 0.98 and 1.38, respectively, showed no uniformity in amount of combined sulfur. In only one case did the coefficients fall closely together. In other words, the chemical state of cure was no index to the physical state of cure. These four organic accelerators, though all reacting with sulfur during vulcanization, do not, when heated in xylene under similar conditions, form insoluble reaction products which seriously interfere with the determination of combined sulfur. N. A. SHEPARD and S. KRALL, *J. Ind. Eng. Chem,* 10-22, 4000 w. CJW.

Measuring Size of Pigments Used in Rubber Manufacture. Review of various important methods used in determination of size of rubber pigments. Examination of these methods of testing pigments is of importance in permitting operator to pre-determine properties of vulcanized rubber that will be produced with pigment. Size of particles also of importance as far as accelerating power of certain mineral accelerators is concerned. Consequently, it is essential to select a method which will give accurate results and which will not require too highly specialized a technic, so that it may be applied rapidly and accurately in the laboratory of the average rubber mill. The Green method found to be very accurate; furthermore it can be readily applied and used successfully by average chemist. Results obtained are not of extreme scientific accuracy, but are satisfactory for all technical purposes. The Vogt or Wiegand method gives results which are sufficiently useful for practical purposes. These methods are very rapid. The Dinwiddie method, which gives very interesting results and which can be used in testing pigments used in the compounding of rubber, is recommended for examination of pigments used in manufacturing paints. A. D. LUTTRINGER, translated by Ismar Ginsberg, *Rubber Age,* 7-25-22. IG.

Accelerating Aging Tests on Rubber Goods. A description of a valuable process for approximately predicting the relative rate of deterioration of rubber compounds In conclusion it is held that it is more reliable to plot curves and compare them than to consider percentage deterioration from the original tensile strength. Samples in the accelerated ageing test are not hardened as in actual ageing, but are definitely weakened. Sulphur changes are noticeable, but not important. Accelerated life test is somewhat more severe than the natural life tests. Too rapid deterioration of the rubber is due in most cases to over or under vulcanization, and chiefly overcure than to any of the compounding ingredients. W. W. EVANS, *Rubber Age,* 8-25-22. If 4000 w. IG.

Selecting Rubber Goods for Foundry. Contributed by Foundry Equipment Manufacturers' Association with the purpose of assisting the foundry purchasing agent. Describes suitable types of and specifications for vibrator, pneumatic tool, sandblast, watering, paint spray, acetylene and oxygen, steel brush and other kinds of hose, gaskets and rubber cloth inserted sheets. *Canadian Foundryman,* 7-22, 1800 w. APS.

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IN spite of the fact that world production of sugar has been larger than was estimated, it is now believed in the trade that the carry-over for this year will not be far from normal. Consumption both in the United States and Europe has been exceedingly large, surpassing all predictions.

A survey of the world situation by the United States Department of Commerce reports that the abnormal surplus of Cuban sugar which existed last January has now been absorbed, and in addition the normal amount of the new Cuban crop has been taken. The revised estimates of world production for 1922 are 1,600,000 tons larger than the earlier estimate, because of the unexpected size of the Cuban crop.

"The rapid distribution of the Cuban surplus since the beginning of the year is shown by the export figures for the first seven months of 1922 and the United States exports for the same period," says the *Western Confectioner*. "Cuba exported 4,000,000 tons, including practically all her old-crop sugar, as compared with 1,800,000 tons for the first seven months of 1921. Of this the United States imported 3,000,000 tons and Europe 800,000 tons, as compared with corresponding figures for 1921 of 1,540,000 and 160,000 tons. The United States exported 755,000 tons of refined sugar in the first seven months of 1922 (85% to Europe) and only 256,000 tons in the corresponding period of 1921."

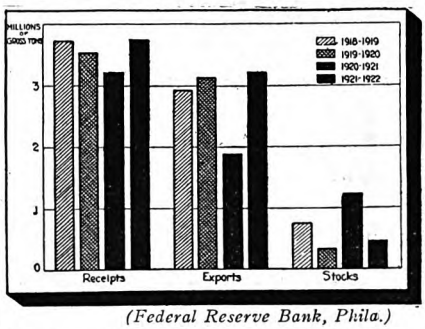
Sugar Purity. Description of a special spindle for making Brix determinations in which temperature corrections can be read directly from the instrument. Clarification is accomplished with a specially prepared dry lead powder, eliminating the measuring of exactly 100 cc. and dilution in exactly 100 cc. The paper ends with the description of a table for reading sugar purities, knowing Brix value and polarization. The method eliminates several common sources of error, thus improving quality as well as quantity of the work done in the sugar laboratory. W. D. HORNE, *J. Ind. Eng. Chem.*, 10-22, 2500 w. CJW.

Sugar-Boiling. Usually conducted in deep, round copper pans, heated by gas or fire. Six degrees or stages are recognized by manufacturer: 215-220° F., smooth stage; 230-235°, thread stage; 240-245°, feather stage; 250-255°, ball or pearl stage; 310-316°, crack stage; and still higher caramel stage, in which variety of colors may be produced. Primarily one of concentrating sugar solution to syrup, but above certain temperature chemical reactions enter in the form of the withdrawal of the elements of water from the sugar molecule itself. Must guard against tendency of sugar to grain on cooling. Customary to add cream of tartar or tartaric acid, acetic acid to sugar to cut this graining tendency. These cause hydrolysis to a mixture of fructose and glucose. Common application is in preparation of fondant or icing sugar, and also in jam making. Analysis of typical jams. J. TAVROGES, *Bakers Weekly*, 8-5-22, 2000 w. CJW.

Solubility of Dextrose in Water. Solubilities of dextrose have scientific and practical interest in controlling processes of manufacture. 100 grams of water dissolve at 0.5° C., 54.32 grams of dextrose at 30° C., 120.46 grams and at 50° C., 243.76 grams. Other facts regarding dextrose hydrate and change to anhydrous dextrose are reported. R. F. JACKSON and C. G. SILSBEE, Bureau of Standards, Scientific Paper, No. 437 (1922), 10 pp. 5 cents. CJW.

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(Federal Reserve Bank, Phila.)

In spite of heavy receipts of raw sugar at Cuban ports during the past crop year, exports have been so large that the remaining stocks are low. Quantities recorded are for the sugar crop year, December 1 to November 30.

Precipitate in Sugarhouse Sirups. Formation of this precipitate, which must be removed to give high-grade white sirup, may be due to materials used in clarification, from substances present in cane itself and finally from soil adhering to the cane at time of crushing. Amount of precipitate cannot be predicted from appearance of filtered juice or sirup. Settling appears to be most feasible method of handling such sirup, as filtration would be too costly. Desired to obtain rapidity of settling and compactness of sediment. Addition of some adsorbent heavy enough to quickly subside and carry suspended matter with it, such as Fuller's earth, precipitated chalk, and calicium phosphate have been tried and show some promise in this connection. J. F. BREWSTER and W. G. RAINES, *J. Ind. Eng. Chem.*, 10-22, 1800 w. CJW.

Standardizing Ice Cream Mix. Discussion of the composition of ingredients such as cream, evaporated milk, milk powders, butter, sugar, syrups and gelatine. Various formulas are given using butter and skim powder; butter, skim powder and water; and a powdered mix. Freshly prepared mix should be allowed to stand cold 24 to 48 hours, when it will regain viscosity. Viscosity may be hastened and uniformity assured by the use of enzyme viscosity, improver or controller. R. W. WASHBURN, *Ice Cream Review*, 8-22, 2500 w. CJW.

Substitute for Candy Test. A simple method is given for the accurate determination of the actual acidity of glucose by means of colorimetric comparison with standards of known hydrogen ion concentration. The difficulties and inconveniences connected with the use of the candy test as a measure of the inverting power of commercial glucose are pointed out. The relation between the inverting effect of glucose as found from the candy test and the hydrogen ion concentration value for a definite concentration has been determined as expressed in the form of a curve. This relation may not hold in the same numerical way under all conditions, that is, with glucose of less uniform purity than the one used, but the difference probably would not be great and could be easily determined. O. A. SJOSTROM, *J. Ind. Eng. Chem.*, 10-22, 3000 w. CJW.

Sandy Ice Cream. Sandy ice cream due to particles or crystals of lactose. Three major conditions: sandy condensed and evaporated milk, excessive lactose in mixes and fluctuation in temperatures in hardening rooms and cabinets. Excessive use of milk solids, not fat is common cause. Danger overcome in part if mix is pasteurized at 145° F. and kept slowly agitated for 25 minutes. Rapid freezing of mixes having high lactose content hastens formation of lactose crystals. Holding ice cream for long time, especially when subjected to wide changes in temperature, has proved to be favorable to formation of sandy cream. O. E. WILLIAMS, *Ice Cream Review*, 7-22, 1600 w. CJW.

Overrun and Quality in Ice Cream. Various methods used to increase yield of cream per gal. of milk. Solid mix of 33% will not stand more than 100% yield and still produce goods which is palatable and has stability under ordinary dispensing conditions. Inflated ice cream has less flavor and aroma per given amount of flavoring material added. It does not give as great apparent coldness to palate. Has less resistance to heat shock. Once soft, it cannot be hardened again to make palatable product. J. H. SEBA, *Ice Cream Review*, 7-22, 750 w. CJW.

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Bright Outlook for Textile Industry

TRADE in all textile markets is much better than it has been for many months, according to the *New York Commercial.* Although, as a rule, orders are still small, except where goods are being offered for the next spring season, they are becoming more numerous, and a larger volume of merchandise is moving out to jobbers and retailers in all sections. In practically every branch of the textile trade and industry continued expansion is reported.

Prices, in many instances, have increased, especially in the case of cottons, woolens and silks. High prices of raw materials and the recent increases in wages are believed to be responsible. There appears to be a more general recognition of the fact that it is a sellers' market in nearly every line of textiles, and that conditions point to further advances instead of declines.

The trade in broad silks for the fall season has been exceptionally good, and there is, as yet, no signs of a slowing up of demand. *The Textile World* points out that the silk industry in Paterson is holding its own financially, that the activity of the mills is increasing to a healthy degree, and that all indications point to a steady and substantial improvement during the months to come.

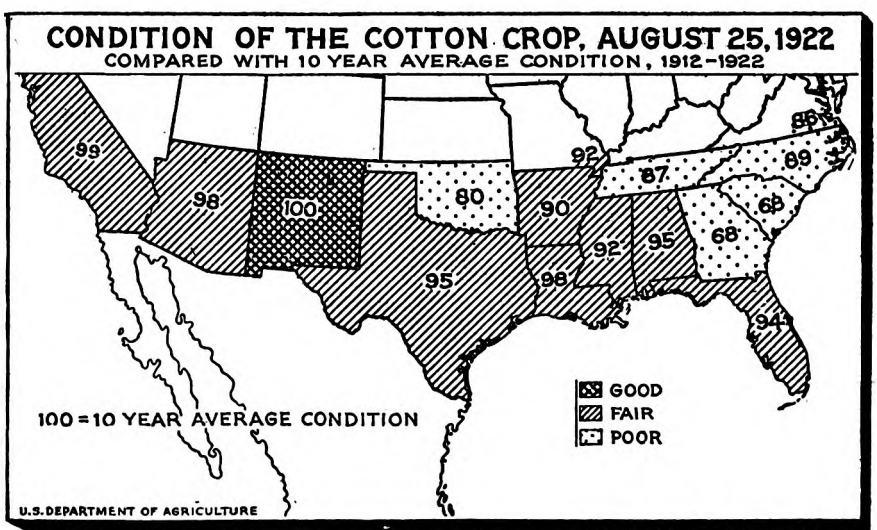
Cotton

Defects in Cotton Cloth. The following are defined: thin place, threads out, floats, scratch up, rope filling—snubby filling—tag filling, overshots, dropped thread, hanging thread, loose thread, wavy, thick places, oil, black and yellow, oily filling, dirty filling, oily warp trouble. *Cotton,* 9-22, 1500 w. CJW.

Fustians. (Continued article.) Constitution cords differ slightly in construction from corduroys proper, chief variation being in method of securing pile picks to ground fabric. Filling is generally inserted in the proportion of two pile picks to one ground pick. Further difference lies in number of warp threads in each group which takes part in actual stitching of pile picks. Illustrated. Certain corduroys are produced in figured patterns with aid of dobby or Jacquard. Ornament should be purely formal, conventional or geometric nature. Illustrated. One of less complex fabrics is known as moleskins. This is smooth-surfaced, heavy, closely woven texture, with something of nature of soft leather in general appearance and handle. Miscellaneous fabrics discussed. T. Woodhouse and A. Brand, *Cotton,* 8-22, 3000 w. CJW.

Testing Cotton Fabrics. Determination of weight per sq. yd. of fabrics from small samples requires utmost care. Tendency to use 10-in. square. Usual method of preparation of sample for testing consists in breaking the number of ends in one inch. Warp and filling threads are tested independently. Mullen test cannot be used on fabric which is constructed with view of strength being required in its use. Well adapted to knitted fabrics. Strip test is most generally used and is most reliable test yet devised for fabrics built for strength. Method of conducing test. Power-driven horizontal tester used in testing tire fabrics and heavy duck, while lighter fabrics are tested by means of vertical tester. *Cotton,* 9-22, 1500 w. CJW.

Fancy Twines. Great opportunity for further development of novelty twines and yarns. Examples seen in manufacture of fish lines, where lines of silk or of fancy colored patterns of cotton and linen are required, in court and booth border lines and cordage, bathrobe ties or girdles, cotton-insulated copper wire, now being taxed by radio, hat trade, candy trade, etc. Effect of good tying in fancy lines very great. Such materials do not require fast colors, but they must be bright. Yarns and twines for decorative work should be both bright and fast. For art and needlework goods must be even both in texture and color. H. D. Martin, *Cord Age,* 9-22, 800 w. CJW.



(U. S. Dept. of Agriculture)

Condition of the cotton crop, in terms of the 10-year average as 100.

Wool

Woolen and Worsted Finishing. Discussion of machines used in shrinking. Best cloths are invariably submitted to process of shrinking, but lower grades are not always treated, because of cost. Theory and principle of shrinking defined as absorption of moisture into every portion of the fabric and slow drying with absolute freedom from strain in any direction. Undoubtedly severe when properly carried out, but cloth submitted to this treatment does not flinch when undergoing damp pressing. Machines for damping cloths to cause them to absorb moisture pictured and explained. Likewise machines for drying. *Textile American,* 9-22, 1500 w. CJW.

Worsted Color Matching. Color matchers are men of varying ability, though they may have had similar training in shade room and class room. Most important work is probably choosing and arranging of suitable ranges of colors and keeping down of stock. Small range of colors necessary in order that each season should display a distinct change in tone. Art consists in producing greatest variety of range, with smallest number of colors. Importance of standards. Color matcher should cooperate with yarn salesman. Samuel Kershaw, *Textiles,* 8-22, 1000 w. CJW .

Dyeing Half-Wool Goods. Part III. Effects possible when using loose cotton and loose wool, that has been dyed and kept separately are many. Six classes considered, depending upon which fiber predominates. Bleaching operations are usually conducted separately and quite differently. Wool is scoured and rinsed and bleached with hydrogen peroxide, cotton with sodium hypochloride. Articles prepared may be pure white yarns with small or strong percentage of cotton, half-wool yarns with no shiny, fibrous effect, cream woolen yarns, having white or cream, shiny cotton fibrous effects, doubled woolen yarns and thick



MODERN BUSINESS

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white or half-white woolen yarns having invisible central cotton thread. Many effects are possible through mixing of bleached and dyed fibers. Include imitations of gold, silver and copper effects, half-transparent colors, composed shades formed in half-wool threads, and bright ombree and changeant effects, etc. Dyeing of wool and cotton in intermixed condition with list of dyes suitable for this. (To be continued.) R. SANSONE, *Textile American*, 9-22, 1800 w. CJW.

Every Business Man Should Know the Answers to These Questions

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How far ahead should raw materials be purchased?

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Silk

Cocoon Production. Customs in South China. Chrysalides killed by farmers on racks by charcoal burners. Farmer accompanies his cocoons to market. Quality judged by merchant by chewing and drawing out fibers, holding cocoon in his teeth. Method of inspection. Mulberry leaves are grown by farmers who sell them to cocoon producers. Six to seven well defined crops of cocoons produced in addition to small crop produced by egg merchants. Quality of cocoon poor when compared with Central China, Japan and Europe. D. E. DOUTY, *Silk*, 8-22, 750 w. CJW.

China Raw Silk Industry. Translation of book on investigation of Chinese silk industry, published in 1919. First two instalments discuss general review of Shanghai market. *Silk*, 8-9-22, 3000 w. CJW.

Alizarine Dyes on Silk. Silk is dyed with alizarine and any one of three mordants, aluminum, chromium or iron. The mordant will naturally be in the form of some salt. Previous to mordanting the silk is discharged, washed and wrung. With aluminum one must expect some loss of luster and pliability. Formulas are given for the various mordanting solutions. The dye bath may advantageously be made up of 80% plain water and 20% boiled off liquor. The total weight of the bath may be about 25% of the weight of the silk. The boiled-off liquor should be free from soda. The silk is placed in the cold bath, worked for 15 minutes, heated to boiling during 45 minutes and boiled for 1 hour. The dyed silk is then washed with water and with soap solution and then treated with 2.5% acetic acid solution. Alizarine black or brilliant alizarine blue are suitable silk dyes. GEORGE EMMONS, *Am. Dyestuff Reporter*, 8-28-22, 2000 w. CJW.

Weighting of Silk. One of most important matters which silk dyers must encounter is requirement to weigh or load silk. Failure to succeed turns largely upon substitutions made by dyer who is engaged in business of following directions given him. Some of these are cited. Weight of original raw silk is to be considered standard. If 100 lbs. raw silk are reduced to 75 by boiling off process and then increased to 150 in dyeing, considered that only 50 lbs. have been added, or the weighting is 50%. Possible to weigh silk 400%. Par silk is silk that when finished weighs exactly the same as the same silk did when raw. Examples of such cases. (To be continued.) J. WOODMAN, *Textile Colorist*, 9-22, 2000 w. CJW.

Fastness of Dyed Silk. Provisional methods on fastness of dyed silk to washing, scouring and fulling published by Research Committee. Contains provisional washing tests, fulling test, classification of colors. *Silk*, 9-22, 750 w. CJW.

Dyeing Wool-silk. In dyeing wool-silk yarns one and same shade, may use acid, basic or direct dyes. Not all dyes of these groups suitable. Lists of dyes that are suitable. General directions for dyeing. Temperature plays an important part, since acid dyestuffs have strong affinity for wool at high temperature, but markedly less or none for silk, while at low temperatures the reverse is true. In using combination of dyes, trouble may ensue because of fact that dyes have their individual average temperature at which it is advantageous to use them. With basic dyes, desirable to use neutral bath. GEORGE EMMONS, *Silk*, 9-22, 1200 w. CJW.

General

Mordants. (Continued article.) In using tannin mordant with antimony or antimony and iron, attention must be given to amount of water in dyebath; it should not be too concentrated. Soluble blues, nigrosines and fast blues are to be dyed in baths containing from 5-10% alum. Special methods for basic dyes on tannic acid. If light shades are desired, basic dyes and tin salts may be employed. If heavy shades are desired tannic acid may be followed by tin salts. Dyeing cops and cheeses on tannin mordant may be carried out by machine methods. In dyeing cotton warps heavy shade with basic dye, ordinary warp dyeing machine may be used in impregnation of fiber with tannin. Piece goods may be mordanted with tannin either in jigger or in padding machine. Actual dyeing may be done very well with jigger. Mixed goods are advantageously mordanted at ordinary temperature. Application of tannins to wool is quite limited. Wool is apt to get harsh. May be used with alizarin colors. JAMES STEELMAN, *Textile Colorist*, 9-22, 2000 w. CJW.

Threads in the Harness. Results of crowding the heddles of the harness noted. In laying out new lot must consider character or raw material of warp threads, nature of twist, rotundity of individual strands, size of threads, extent to which threads have been treated with sizing, tension to which threads are to be put in weaving, and character of weave and number of picks per inch. Crowning, chaffing and unnecessary friction will cause threads to break as well as to hinder free action of harness. Effect of various conditions noted. *Southern Textile Bull.*, 9-14-22, 800 w. CJW.

Baling of Fibers. Next to preparation of fiber, there is nothing more important to cordage manufacturer than baling. Essential condition is that wrappings and ropings should be sufficiently strong to enable goods to arrive at destination without defect. On other hand, weight that is unnecessary is undesirable. Jute may be baled to volume of 50 cu. ft. per ton without injury to fiber. Other fibers deserve study as to methods of baling. A. WIGGLESWORTH, *Cord Age*, 9-22, 500 w. CJW.

Lime in Textile Work. Lime is largely used in cotton manufacture in bleaching, dyeing and finishing departments. Chemistry of lime. Lime in bleaching. To be continued. W. B. NANSON, *Textile American*, 9-22, 2500 w. CJW.

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When Oil and Water Mix!

(From page 1680)

Pioneers in Mexican oil are sure that new fields will be found, and that the country has a great future. Oil seepages are found in a number of places where productive wells have not yet been sunk; but even if oil pools are found at every seepage point the life of the Mexican fields is short. Oil men think that petroleum will be found in places where no trace of it now appears. Chairman Doheny of Mexican Petroleum has said:

"There are substantial pools of oil in places far away from any seepages, and far away from volcanic masses and the scenes of volcanic action."

All this remains to be seen. As Warren C. Pratt says in the *National Petroleum News:*

"What Mexico holds for the oil man only actual drilling will tell. That drilling is going to cost money—not so much, perhaps, as such things have cost in the past, because the companies have their present bases of supply to work from and much costly experience to go by. But a quarter of a million dollars of American money per wildcat is one estimate that can't be so far out of line."

Which brings to mind George Fitch's description of the drilling of an oil well:

"An oil well," he wrote, "is a hole in the ground about a quarter of a mile deep, into which a man may put a small fortune or out of which he may take a big one. And he never knows until the hole is finished. It takes a couple of thousand dollars, several months, and a couple of non-committal men in mud-plastered overalls to dig an oil well. They begin by going up about 60 feet. When they have finished their derrick, they hang a drill on it weighing half a ton. Then the men hitch the drill to an engine and punch a 42-centimeter hole in the earth's crust. Sometimes, after they have been punching away for several weeks, the hole blows the derrick into the sky, utterly ruining it. Then the owner shrieks with glee, and employs 500 men to catch the spouting oil in barrels. But sometimes the derrick is as good as new when the hole is finished. Then the owner curses and takes the derrick away to some other place which smells oily."

Mexico today is full of places that smell oily to the prospector. Unless something is found there besides the odor, Mexico's career as an oil-producting nation is nearly closed.

Cement Industry Picking Up

DUE to the increased building activity there is a marked recovery in employment in the stone and clay industries. The anxiety of brick and cement manufacturers to speed up production to the greatest possible degree, before winter adds to the transportation difficulties, has created a demand for skilled and unskilled labor.

Our War Debts

(From page 1671)

States might have in mending matters would depend very largely upon the plans of the European statesmen. He felt, however, that America would finally do her proper part in solving the major difficulties which beset the world. This she could well afford to do, he added, because her moral and financial power is greater than that of any other nation in civilized history.

"By helping others to help themselves," Mr. McHugh said, "we shall indirectly help ourselves, and reflection will be found in improved domestic conditions and values."

America, according to his view, can look forward with assurance to the future, not only because of her supreme strength, and the intelligence and stability of her people, but because every lesson in her history teaches that in overcoming crises she has always given a new and firmer direction to her own prosperity.

Reginald McKenna, former British Chancellor of the Exchequer, told the bankers that the debts of Europe to the United States should be revised. Only England can pay in full, he said. The convention was by no means unanimous in accepting this view; but the opinion seemed to be universal that the United States should take some sort of action toward helping the European situation. Just what form that action should take the bankers did not seem inclined to say.

Labor

(From page 1691)

April, 1922, when the low point was reached, and a decrease of $3.83 from the high point, which was reached in October, 1920.

The largest gain in August was due to the increased earnings in the railway repair shops, where strike conditions curtailed earnings in July, but resulted in very high earnings in August. Most of the metal trades, the stone products industries and the wood manufacturing industries reported gains. There was also a seasonal gain in the clothing industries and a seasonal reduction in the food products industries. In the textile industries earnings averaged somewhat lower as a result of vacations. In the paper goods industries and the chemical and oil products industries average earnings were slightly reduced. Few changes in wage rates were reported, but the increases were much more numerous than the decreases.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

of THE INDUSTRIAL DIGEST, published bi-weekly at New York, N. Y., for October 1, 1922.

State of New York } ss.
County of New York }

Before me, a notary public in and for the State and county aforesaid, personally appeared Prentice Winchell, who, having been duly sworn according to law, deposes and says that he is the editor of THE INDUSTRIAL DIGEST and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption required by the Act of August 24, 1912, embodied in Section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business manager are:

Publisher, Periodical Digest Corporation, 25 West 45th St., New York, N. Y.

Editor, Prentice Winchell, 25 West 45th St., New York, N. Y.
Managing Editor, Prentice Winchell, 25 West 45th St., New York, N. Y.
Business Manager, E. F. Warner, 25 West 45th St., New York, N. Y.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.)

Periodical Digest Corporation, 25 West 45th St., New York, N. Y. (A. F. Oakes, 461 8th Ave., New York, N. Y.; M. Blumenthal and Prentice Winchell, 25 West 45th St., New York, N. Y.; Perkins-Goodwin Co., 33 West 42d St., New York, N. Y.; Field and Stream Pub. Co., 25 West 45th St., New York, N. Y.; L. Levy, 295 Fifth Ave., New York, N. Y.; Stockholders of Field and Stream Pub. Co., Inc., are E. F. Warner and B. M. Burkhard, 25 West 45th St., New York, N. Y.; Stockholders of Perkins-Goodwin Co. are E. F. Crowe, Estate, Louis Calder, F. W. Westlake, John Atkins, S. Goldman, W. F. Anders, J. A. Brady, C. W. Rantoul, C. T. Rue, all of 33 West 42d St., New York, N. Y.)

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

PRENTICE WINCHELL, Editor.

Sworn to and subscribed before me this 25th day of September, 1922.
(Seal) A. W. SUTTON.
(My commission expires March 30, 1924.)

The INDUSTRIAL CALENDAR

Secretaries of Associations are invited to send us the dates of their conventions as early as possible so that their conventions may be properly listed below. When especially requested by Association Secretaries, we will send dates and other available notices concerning meetings of other associations.

Oct. 16-18. *National Association of Ice Cream Manufacturers,* Hollenden Hotel, Cleveland, O.

Oct. 16-19. *American Public Health Association,* Cleveland, O.

Oct. 16-20. *Automobile Accessories Branch of the National Hardware Association,* Ambassador Hotel, Atlantic City, N. J. (T. James Fernley, Secretary, 505 Arch St., Philadelphia, Pa.)

Oct. 16-21. *"Management Week" of the American Society of Mechanical Engineers* (The Society of Industrial Engineers and The Taylor Society co-operating). (Calvin W. Rice, Secretary, 29 West 39th Street, New York City.)

Oct. 17-19. *American Railway Bridge and Building Association,* Cincinnati, O. (C. R. Lichty, Secretary, Chicago & North Western Ry., 219 North Waller Avenue, Chicago, Ill.)

Oct. 17-21. *Association of Ice Cream Supply Men,* New Cleveland Public Hall, Cleveland, O.

Oct. 18-19. *Southwestern Business Congress,* Tulsa, Okla.

Oct. 18-20. *Society of Industrial Engineers,* McAlpin Hotel, New York City. (George C. Dent, Business Manager, 327 S. La Salle Street, Chicago, Ill.)

Oct. 18-20. *National Association of Farm Equipment Manufacturers,* Chicago, Ill.

Oct. 19-25. *Southern Textile Exposition,* Textile Hall, Greenville, S. C.

Oct. 20-21. *American Society of Civil Engineers, Texas Section,* San Antonio, Tex.

Oct. 23-25. *National Association of Commercial Organization Secretaries,* Hotel Statler, Detroit, Mich.

Oct. 23-30. *Annual Business Show,* Grand Central Palace, New York City. (Mr. Tate, Manager.)

Oct. 24-25. *Society of Automotive Engineers, meeting of Springs Division, Standards Committee, with Chain Division, Standards Committee, with Power Transmission Chain Committee of American Society of Mechanical Engineers,* Cleveland, O.

Oct. 24-26. *Southern Logging Association,* Grunewald Hotel, New Orleans, La.

Oct. 24-27. *American Gas Association,* Atlantic City, N. J. (Oscar H. Fogg, Secretary-Manager, 130 East 15th Street, New York City.)

Oct. 25-26. *American Manufacturers Export Association,* Waldorf-Astoria, New York City. (Maurice B. Dean, Secretary.)

Oct. 25-27. *American Trade Association Executives,* The Inn, Buck Falls, Pa. (C. B. Harman, Secretary, 1026-27 Candler Bldg., Atlanta, Ga.)

Oct. 25-28. *Pacific Coast Logging Congress,* Tacoma, Wash.

Oct. 26. *Society of Automotive Engineers, meeting of Iron and Steel Division, Standards Committee,* New York City.

Oct. 26-27. *National Meeting of Society of Automotive Engineers,* Detroit, Mich.

Oct. 26-28. *National Conference for the Study of Highway Engineering and Highway Transport Education,* Washington, D. C.

Oct. 30-31. *Society of Automotive Engineers, meeting of Parts and Fittings Division, Standards Committee, and Transmission Division, Standards Committee,* Detroit, Mich.

Oct. 30-Nov. 3. *Association of Railway Electrical Engineers,* Hotel La Salle, Chicago, Ill.

Oct. 30-Nov. 11. *National Food Show,* 102d Engineers Armory, New York City.

Nov. 1-3. *Society of Automotive Engineers, meeting of Passenger Car Division, Standards Committee, with Passenger Car Body Division, Standards Committee, with Electric Vehicle Division, Standards Committee.*

Nov. 6-7. *Society of Automotive Engineers, meeting of Engine Division, Standards Committee, with Agricultural Power and Stationary Engine Divisions, Standards Committee,* Chicago, Ill.

Nov. 6-7. *Eastern Assn. of Cleaners and Dyers,* Reading, Pa.

Nov. 8-9. *Society of Naval Architects and Marine Engineers,* New York City.

Nov. 9-19. *Annual Exhibition Automovil Club Argentino,* Buenos Aires, Argentina.

Nov. 13-15. *Southwestern Assn. of Cleaners and Dyers,* Joplin, Mo. (Tentative.)

Nov. 13-18. *Automotive Equipment Assn.,* Chicago, Ill.

Nov. 15-16. *National Industrial Traffic League,* Hotel Commodore, New York City. (J. H. Beek, Secretary, Chicago, Ill.)

Nov. 15-17. *American Bottlers of Carbonated Beverages Convention,* Atlanta, Ga. (Junior Owens, Secretary, 726 Bond Bldg., Washington, D. C.)

Nov. 17-26. *International Health and Safety Exposition,* Municipal Auditorium, Oakland, Cal. (Blanks Everett, Secretary.)

Nov. 20-25. *National Hotel Exposition,* Grand Central Palace, New York City. (Mark A. Cadwell, Secretary, 334 Fifth Ave., New York City.)

Nov. 22-23. *National Founders Assn.,* Chicago, Ill. (J. M. Taylor, 29 South La Salle St., Chicago, Ill.)

Foreign Events

Nov. 3-11. *Olympia Automobile Show,* London, England.

Nov. 10-Dec. 19. *Automobile Show,* Palais de la Cinquantenaire, Brussels, Belgium.

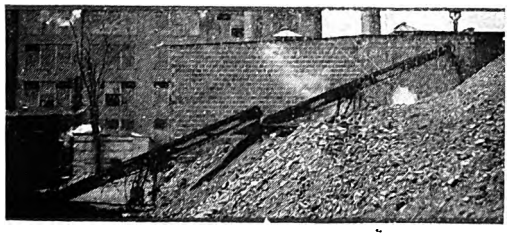


Unloading

Without		With
50 tons	Quantity	50 tons
5	Men	2
9 hrs.	Time	3 hrs.
35c	Hourly Wages	35c
$15.75	Unloading Cost	$2.10
31½c	Cost Per Ton	4.2c
	Save Per Ton	27.3c

(Figures courtesy A. J. Oburt, The Ochs & Frey Co. Allentown, Pa.)

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Without		With
3000 tons	Quantity	3000 tons
30	Men	4
85 hrs.	Time	85 hrs.
40c	Hourly Wages	40c
$1020	Storing Cost	$137
34c	Cost Per Ton	4.5c
	Save Per Ton	29.5c

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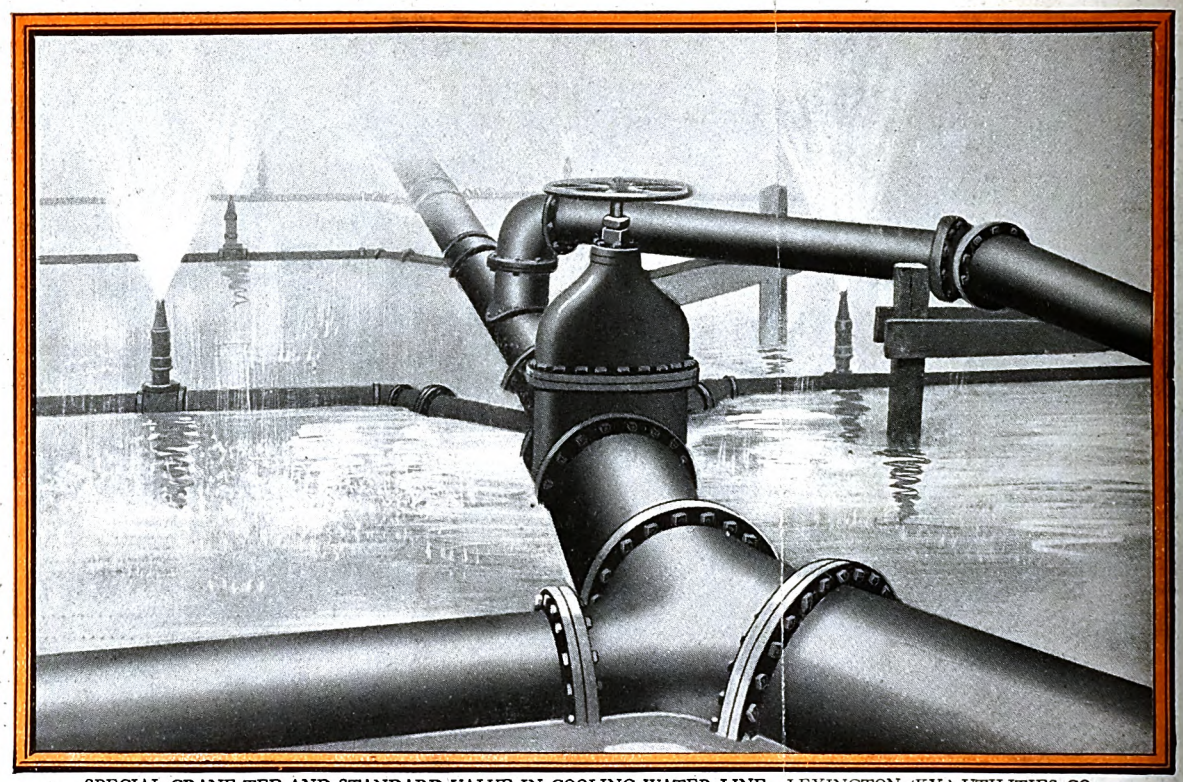
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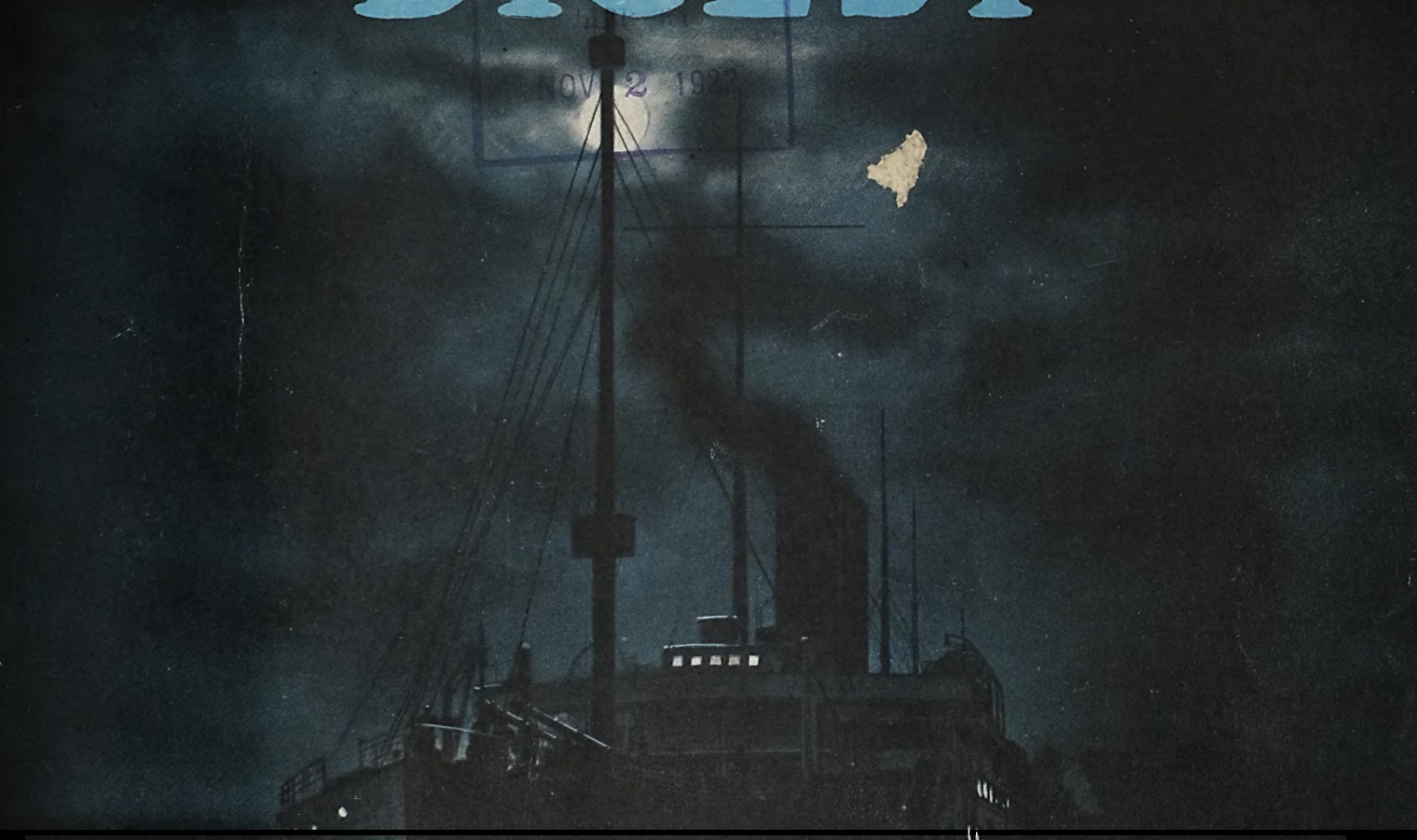
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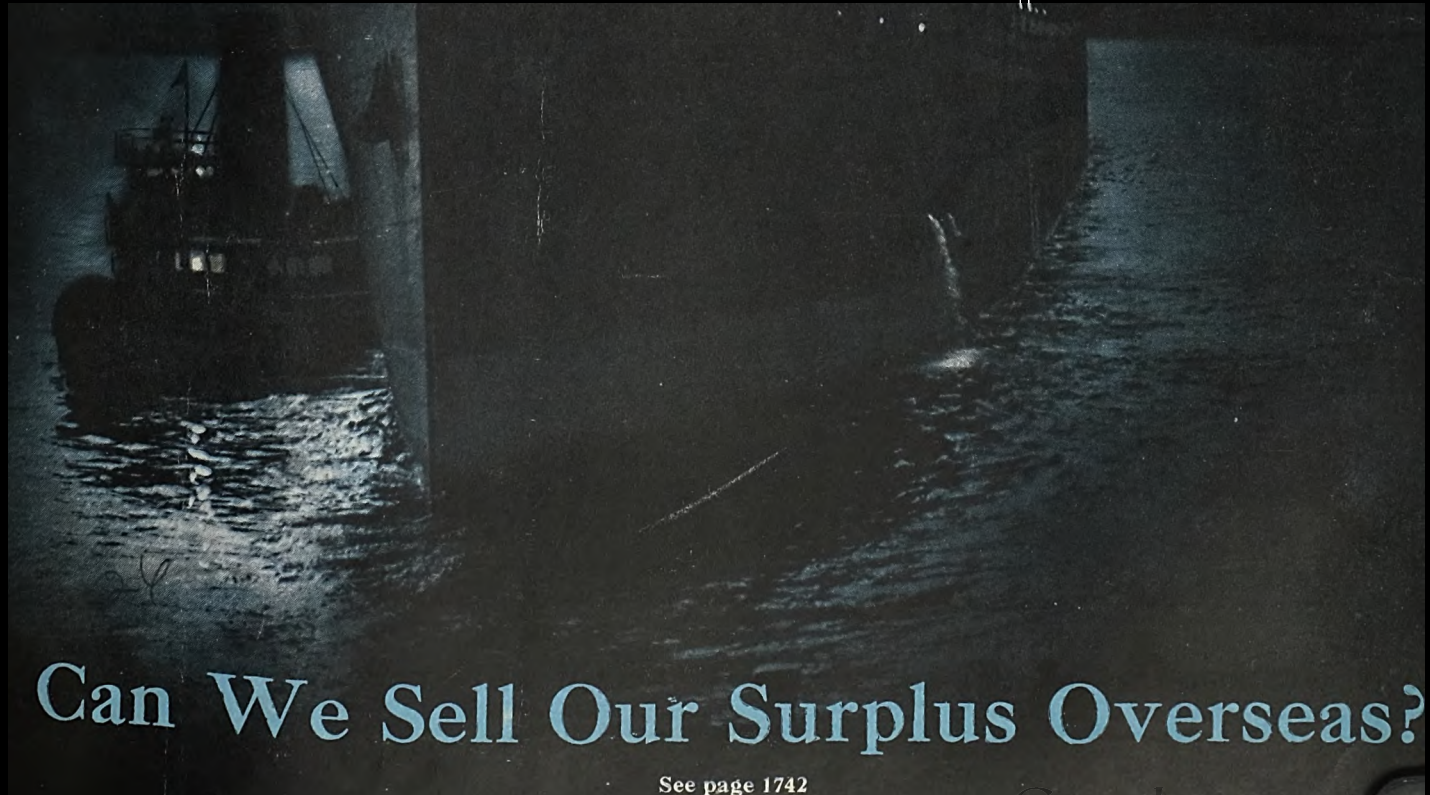


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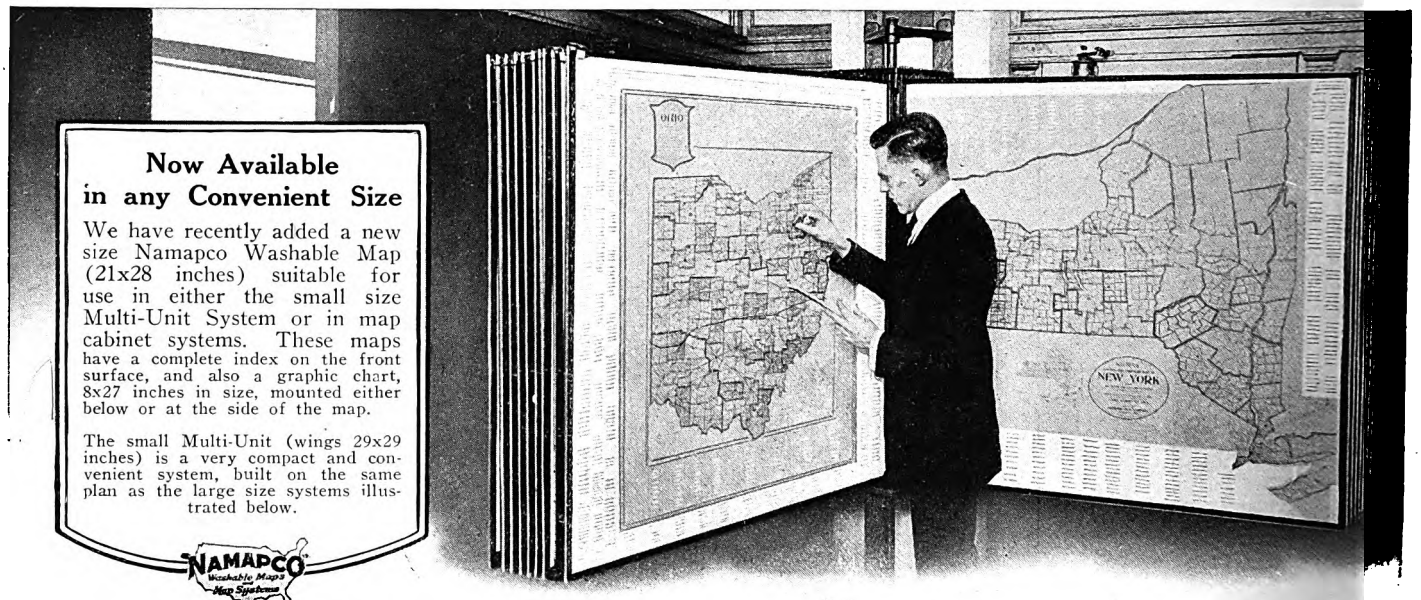




Can We Sell Our Surplus Overseas?

See page 1742

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NAMAPCO Washable Maps and Map Systems

As Valuable to the Sales Manager as Blue Prints to the Builder

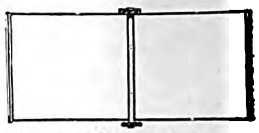
BEFORE a spade is sunk or a stone laid, the builder has his plans, carefully drawn and checked, for the complete building. The architect has visualized the building for him, given him definite plans to refer to and to check up with. No chances for a slip anywhere along the line.

So it is with the successful sales program. Invariably it is carefully planned and charted. The market is visualized, territorial divisions shown, and the work for each salesman, distributor and dealer carefully laid out. Then it is a matter of checking up on sales developments in every territory—of knowing every day the exact situation in every district—of strengthening the weak points in the sales offensive—of working out the program.

Many of the most successful business concerns in America plan their sales work and work their sales plans on Namapco Washable Maps. The washable surface of these popular business maps enables you to mark on them with crayons, inks or water color paints, and to change the marking as often as desired. Simply wash the map with a sponge or damp cloth, or erase with art gum. In this way you can show territorial divisions, location of distributors, dealers, salesmen, agents, etc., sales quotas, sales totals, and various other sales information and statistics.

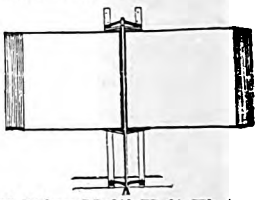
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Our new illustrated catalog of washable maps and Multi-Unit display fixtures shows and tells how many well-known firms use maps in their sales and territorial work. A request will bring you a copy. Address Dept. D-11, Murphy Bldg., Indianapolis.



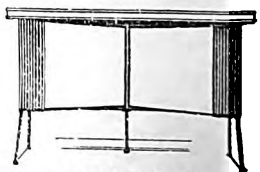
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Displays eight maps, all of which may be turned in either direction or spread apart as shown.



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Displays 44 Maps. Will accommodate the entire series of state maps. All wings may be spread in either direction.



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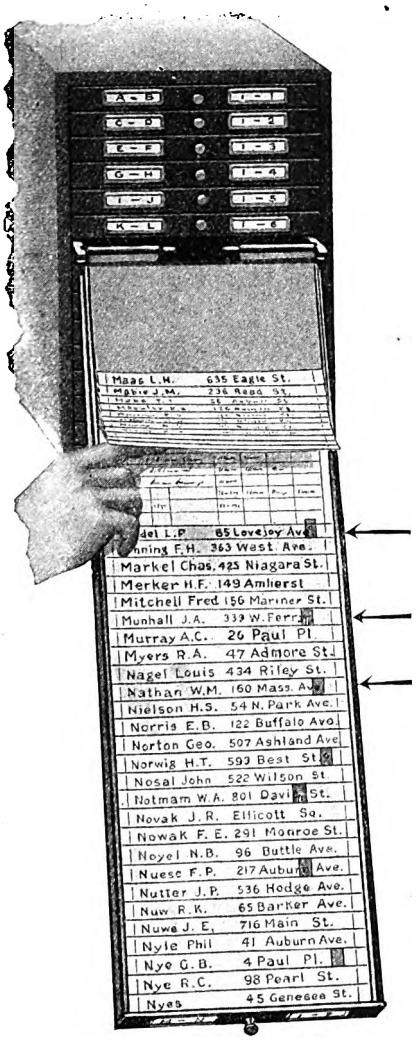
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The figures of failure—they do not lie

WE HAVE our own kindly phrases for explaining failure. We say:

"He had hard luck" or

"Things went against him" or

"He worked hard but he just couldn't seem to make it go."

But Bradstreet's, being an unemotional institution, uses other phrases. Of the business failures in the past year they attribute 74.8% to the "fault of the person failing"—see table in the center of this page. They call these figures of failure Incompetence, Lack of Capital, Inexperience, Fraud. The table is worth a few minutes of your time and thought, no matter what your position, for

Every man in business is in business for himself

The manager, the salesman, the accountant—each is his own employer and is determining, by what he knows and does, how much his income is to be increased. If you are destined to failure, if at the end of this year you are no farther along than you were at the beginning, the chances are seven out of ten that the cause will be one of those listed on this page. You may excuse yourself under a more kindly phrase, but that will not change the fact.

How 200,000 men have insured against failure

The Alexander Hamilton Institute in a booklet entitled "Forging Ahead in Business" gives the facts about a training which has enabled nearly 200,000 average business men to guard against failure, and insure steady, profitable business progress.

"Bradstreet's Record of Why Men Fail"

CAUSE—	
* Incompetence	38.2%
* Lack of Capital	30.3
* Inexperience	5.6
* Unwise Credits	1.3
* Fraud	7.0
Failure of others	1.7
Extravagance	1.1
Neglect	1.7
Competition	1.1
Specific conditions	11.3
Speculation	.7
Total	100.00%

* These are the needless failures that a well rounded business training would prevent.

These men represented every sort of business position. They were executives, salesmen, accountants, engineers, lawyers, chemists, factory and office men. The Institute did not make them better specialists in the one department of business where their experience had been gained. It added to that knowledge a working knowledge of *all the other departments*. So, by rounding them out, by strengthening them where they were weak, it helped them to avoid the pitfalls.

The Advisory Council

Only a training vitally sound and practical could have the indorsement of such men as form the Advisory Council of the Alexander Hamilton Institute.

That Advisory Council consists of: Frank A. Vanderlip, the financier; General Coleman duPont, the well-known business executive, John Hays Hammond, the eminent engineer; Jeremiah W. Jenks, the statistician and economist; and Joseph French Johnson, Dean of the New York University School of Commerce.

Send for the facts

"Forging Ahead in Business" is published not to persuade men to enrol with the Alexander Hamilton Institute, but merely to lay before thoughtful men the full facts. Will you, for the sake of your business progress and the security of your family, give the book one hour of consideration? It will be sent to you cheerfully on that condition.

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Vol. 1
No. 26

THE
INDVSTRIAL DIGEST

Oct. 28
1922

The Business Weathervane

A Summary of Expert Opinion

Practically all economists and statisticians agree that the gradual rise of prices will continue for the better part of the year at least.

Under these circumstances the question arises: Can demand keep pace with the steady increase in producing capacity of the nation?

The United Business Service writes: "Unless we find new world markets for our products will not there come a time when production must stand and wait for demand?

"For immediate purposes, say for the next two years at least, the answer will be found in an analysis of the foundation of the present increasing demand. Such an analysis reveals the following conditions:

"1. During the war the producing capacity of the country was concentrated on war-making materials. Production of peace time supplies was suspended. 2. The downward trend of prices which followed caused the resumption of production to be still further delayed. 3. Distributor and consumer buying has, for the past two years, been largely on a hand to mouth basis. 4. The wealth of the nation increases as production is increased. This in itself creates still further demand.



(New York American)

Why not hitch up the horse, Uncle?

"There is still another factor which will have an important influence on buying during the next two years. This is the probable upward trend of prices for this period. When prices are going down purchases are delayed. When buyers face the possibility of having to pay $1.05 tomorrow for something they can buy today for $1.00, an entirely different result is obtained."

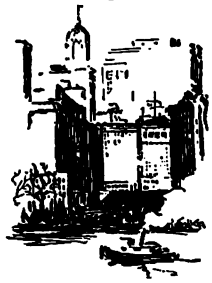
The Harvard Economic Service believes that: "The upward movement of business activity continues to be registered by evidence other than that purely statistical. News items indicating a shortage of labor, or announcing a wage advance by an outstanding industrial corporation or the voluntary settlement of strikes upon terms not unfavorable to labor, are symptoms of the condition which the statistical evidence is indicating in measurable terms. Such announcements, at this stage in the business cycle, can generally be interpreted to mean that orders are increasing, that accumulated stocks have been worked off, and, most important, that profits are reappearing where a little while ago red ink figures predominated."

The Survey of Current Business, issued by the Department of Commerce, states that "the encouraging feature of the present industrial situation is the breadth of the increased activity. It is not confined to a few industries, but seems to be generally felt throughout the industrial community. Factory employment, where reported, also appears to be the highest since the end of 1920, a factor that should result in a more even distribution of buying power."

And **Bradstreet's,** reviewing last week's trade, states that with the possible exception of collections, which are still, relatively speaking, backward, the general industrial situation is the best since the late spring of 1920.

"Cold weather stimulating retail trade; marked activity in building in an effort to finish up operations, with scarcity of skilled mechanics resulting; improved jobbing trade, with more disposition to buy for the future, and spring buying frequently mentioned; holiday buying of certain lines; a slight easing in some regions in car supply, but complaints of shortages still widespread; easing in fuel and metal prices, but more strength in other commodities, with especial firmness in textiles and a very generally good pace in manufacturing lines, go to make the trade review this week a very cheerful one."

The **Brookmire Economic Service** believes that "The pressure of demand for goods is likely to straddle the period of car shortage and intensify rather than diminish while car shortage exists, and by spring will exert a terrific pressure upon manufacturers and distributors. The fundamental situation in commodities is so strong, and the outlook so bright for a continued demand this fall and a revived demand of great proportions next spring, that accumulations are not only advisable, but imperative."



The Fortnight

Lloyd George and American Business

WITH Lloyd George's resignation the last of the "Big Four" has stepped down. Wilson, Clemenceau, Orlando—all have been relieved of office. The effect in England, at least, is a feeling of unrest which will doubtless continue until the Parliamentary elections, which will take place the middle of November. Since Great Britain's attitude toward the Continent—political alliances, German reparations, debt repudiation, etc.—is of primary importance, a summary of the situation may be useful.

The line-up for the campaign will be somewhat as follows: The Unionists, under the leadership of Andrew Bonar Law, now have a large majority, but possibly face a reduction owing to the number and strength of the several parties in the field. Second is the Coalition Liberals, under the leadership of Lloyd George. This party is reputed to have a "war chest" of at least £3,000,000 with which to conduct its campaign. Third the followers of Austen Chamberlain, who are Unionists but are favorable to a coalition with the Lloyd George Liberals. Fourth, the followers of former Premier Asquith, who have planned to contest some 300 seats in Parliament. Fifth, the Laborites, who, under the leadership of Arthur Henderson, see a possibility of great gains to their party in the present confusion.

It is not at all certain that Lloyd George is to be out of the saddle for long. Many editors on this side of the water are predicting that his return to the leadership is certain in the near future. The Liberals and the Unionists are certain to unite against the Labor party if that group becomes too powerful. Thus we have, after a fashion, a parallel of those conditions which occur in this country where the Republican and Democratic parties back the same candidate when he is opposed by a powerful Socialist.

The consensus of opinion seems to be that Lloyd George is less dangerous in office than out of it. With the responsibilities of state removed from the shoulders which have carried the weight for seven years, the Welshman is almost certain to favor radical policies. If the Conservative element in England is desirous of eliminating rash tendencies in administration the removal of Lloyd George is hardly destined to quiet their apprehension.

Until the November elections, little will be known definitely concerning England's foreign policy, and consequently the stock market here has found it difficult to interpret the Premier's resignation. Some stocks reacted on the news, others showed an advance. Certain it is, however, that if Lloyd George remains out of office Britain's financial policy will be altered to some extent and in consequence, the international debt situation and the European political situation will be changed—and the change, however slight, is sure to affect business here.

The Troubles in Washington

NOR is the Administration on this side having any too easy a time of it. The Daugherty injunction has definitely lined up the labor vote against the Republican party. The effect of the Bonus bill has certainly antagonized a large portion of the soldier vote. The Tariff bill has but added to the worries of President Harding and his advisors. In fact, the Administration is laying all possible stress upon the present prosperity of the country as being due to his Administration rather than pointing to the excellence of legislation produced by the recent Congress. Also members of the Cabinet have been very active in emphasizing the executive economy of the present régime.

The activities of the Attorney General have made it none too easy for the man whose campaign he managed so successfully. The injunction issued to prevent ships from carrying liquor within the three-mile limit has, according to papers which come to our desk, caused more unfavorable comment than any other single act of the Administration. If this action was intended to pave the way for easy passage of the Subsidy bill it was certainly ill-advised. If the Subsidy is sound it will pass on its merits—if it is unsound it cannot be passed by means of any concessions to the Anti-Saloon League.

To complicate the political situation on this side, Labor has shown an unwonted activity in the political field. The article which appears on page 1738 of this issue shows the extent to which the idea of a Labor party has been carried up to date. A party organized



After Having Been Becalmed for Months on a Glassy Sea—

And Then Buffeted and Tossed by a Storm of Discontent and Unemployment.

And Just Barely Missing a Total Wreck on a Stern and Rockbound Coast—

It Would Seem as Though Folks Ought to Begin to Show Some Signs of Contentment.

(Tribune Syndicate)

"We ought to be glad we're alive."

in Perspective

on the plan of the British Labor Party would very materially change the complexion of politics in this country.

The Tariff's Aftermath

ALMOST significant fact is that customs receipts have been recently running at more than $1,250,000 a day despite the fact that Treasury experts had estimated that during the first month of operation of the new tariff the average would probably fall as low as $500,000 a day. Certainly a great deal of the receipts is due to a rush of imports contracted for in anticipation that the new law would not be operative before November. On the other hand, the revival of buying on the part of the consuming public cannot effect domestic trade so greatly as it has during the last two months without stimulating the demand for foreign goods as well. Then, too, the fact that Europe is steadily recovering her productive capacity and has brought costs down to so low a figure as to make it possible for her to share in our American market *despite* the present tariff. This situation will undoubtedly change as the exchange rates become more balanced.

The uproar which followed the passage of the Tariff bill has quieted down to a great extent, but individual manufacturers, and, of course, importers, are besieging the Tariff Commission with requests to remedy the "errors" in the bill. The Commission has had to rebuild largely its personnel and this has held matters up. Formal regulations concerning the procedure of the Commission are to be announced in a few days. No action will be taken by the Commission prior to this announcement.

Business Outlook Is Brighter

APART from seasonal declines in those lines which anticipated a drop in sales, business activity continues in satisfactory volume. Unemployment is diminishing all over the country and a scarcity is developing in some sections. Commodity prices are slowly rising and there will undoubtedly be more and more demands for wage increases. It is entirely possible that this may lead to a renewal of strike activity. On the whole, wages are certain to be higher.

Chain-store sales have been increasing steadily and the retail trade in practically every line is optimistic. Mail-order companies show gains, and the increased buying power of the farmer is slowly making its impression. New building continues to lead the industrial advance, and rents are taking a downward trend. Failures are materially decreasing. Money rates are stiffening. Railroad earnings are satisfactory. Anthracite production is increasing; though bituminous is not yet satisfactory, there will be enough for most industrial demands for the winter.

Conditions point to increased business, at least until the first of the year, and probably until the first of March. Christmas retail business should be from 10% to 15% larger than last year, and manufacturers are likely to find on account of the trend toward increased prices that their orders will show an even larger gain.



(New York Tribune Syndicate)

There's a gentleman at the door with a bundle.



(St. Paul Pioneer-Press)

Go to the rescue for the sake of the lady.

Industry Watches the Political Pot

The question "How will labor vote?" may be answered by the formation of an active labor party

SOMETHING is happening in the ranks of labor. Just what that something is, political observers are not agreed, but certain it is that it takes the form of unrest. The Landis award in Chicago, the Coronado case, the Daugherty injunction during the rail strike, Federal and State action during the coal strike—all these have stirred labor up to such a point that it will undoubtedly play a more prominent part in politics this coming election than ever before.

The American Federation of Labor has always believed in a non-partisan policy, a policy of action against the candidates who are against labor. In the words of Gompers, "Reward your friends and punish your enemies." Mr. Gompers is a Democrat, and it is to be expected that accordingly the Democratic candidate is usually found more "favorable" to labor than the Republican one. But there seems to be a break in the ranks of organized labor away from Mr. Gompers' policy.

On October 15, in New York City, was launched a new labor party—avowedly based on the successful and powerful English labor party. This new American labor party proposes to weld together into a political unit the Farmer Labor party, the Socialist party, and any other radical groups, such as the Communist Labor party, and so forth that can be whipped into line. This fall the campaign is to be only in New York State. As Morris Hillquit, Socialist, puts it in the *New York Call,* "the results of this election will demonstrate the futility of electing a working-class candidate on possible, the debt must be removed from the field of debate." anan old party ticket. . . . Organized workers will become convinced through the results of election, and even more, through the conduct of their candidates after election, of the futility of non-partisan balloting. The realization that the only solution lies in such a party as the British Labor party . . . is inevitable."

And in a recent article in *Labor Age* entitled, "Can Labor Capture the Government," we read

"'Experience is a good teacher,' writes John Brophy, president, District No. 2, United Mine Workers of America, in answer to our question: 'Why are the miners thinking politically?'

"The last national convention of the miners declared for a new political party, combining the forces of organized labor and the organized farmers. We asked the question of Brother Brophy, because the Pennsylvania miners have been the forerunners of this movement.

"'Time after time labor has gone to the Pennsylvania State Legislature,' he says, 'to secure necessary social legislation—and has been disappointed. Of late, we have received even less attention—and that applies, also, to Congress. As Secretary Quinn, of the Pennsylvania State Federation of Labor says: The claims of Labor for legislation to its advantage were treated with scant courtesy. This is due to several causes. One cause is that Labor has been, and still is, very much disunited politically, and our opponents easily succeed in getting the majority in the Senate and the House. Another is that they who seek the legislative honors, frequently do so as mere stepping stones to political distinction and promotion to other political offices. The friendship of the machine politicians is, therefore, very necessary to them.'

"'The result is: we are convinced of the need for a Labor party, to which other progressive elements will be attracted.

"'But there is another reason for this view. The miners, also, have declared for nationalization of the mines. We say to the 'public': 'We want you to own the mines. We want them to be run for service, not profits.' To secure nationalization we need political action. The two go hand in hand. The two old parties can scarcely be trusted with our program. They have shown no signs of being interested in it. Our own party, under our control, should make nationalization a certainty."

And in the same issue—

"For the first time since 1893 there is wide discussion in the trade unions regarding their relation to politics and independent political action. There is an indefinite feeling that the unions have not taken full advantage of the suffrage of the members to protect them against the assaults of the employers.

"For the first time in their history most of the railroad brotherhoods are active in politics. They have hitherto remained free of any political activity. *They would not even join A. F. of L.* in its policy of endorsing friendly candidates of the Republican and Democratic parties."

The article points out that the brotherhoods' activity is a break with old inaction policy, and that such a break has happened in every English-speaking country. But to expect immediate formation of an independent party would be too much. The brotherhoods have advanced but affiliated unions have not.

". . . There is no instance in the history of the labor movement of any country where the nonpartisan policy has proven successful. In every case where the organized masses have obtained victories it has been through an independent party of their own.

"It is hoped that when the next national meeting of the conference on progressive political action is held in December the first big steps will be taken toward the organization of such a labor party."

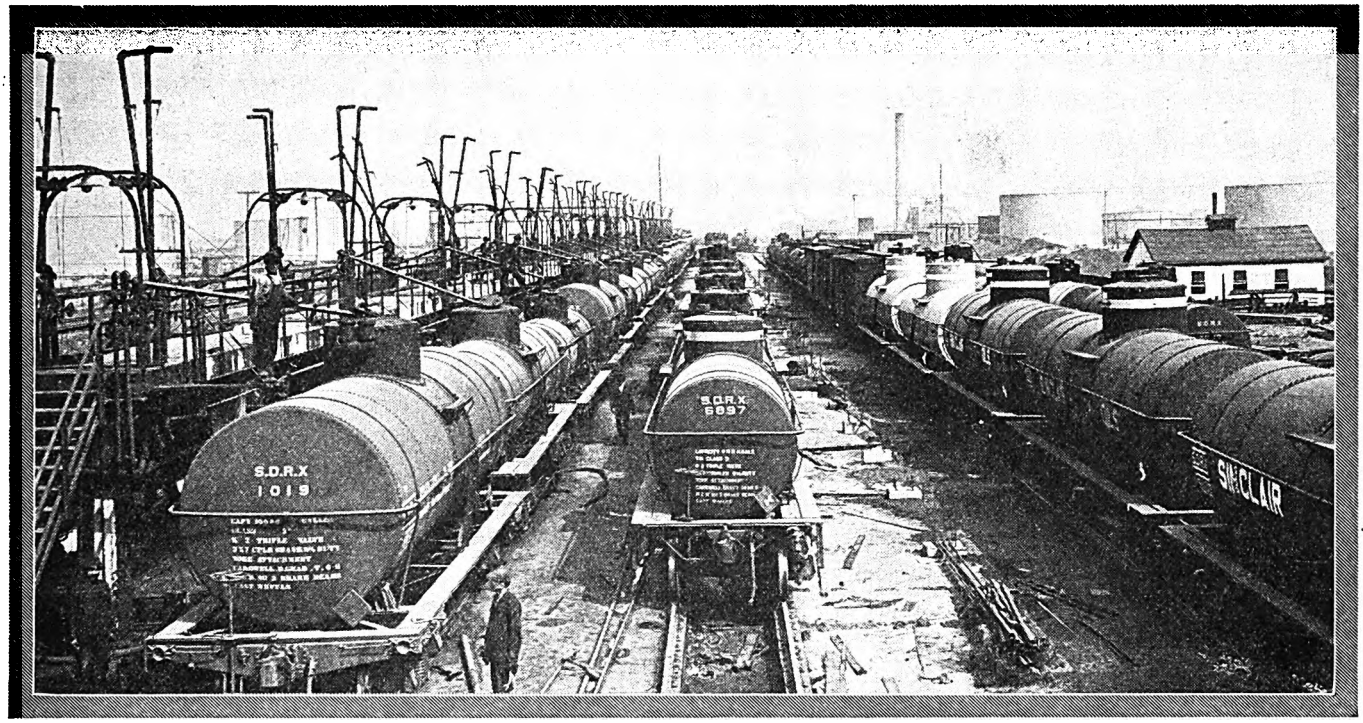
This is taken by some observers to mean that the conference in December will support the American Labor Party, provided a showing is made in the New York State fall elections.

Is it anything more than coincidence that Frank A. Munsey, publisher, recently advocated the merging of the Republican and Democratic parties against a common radical foe, or that Nicholas Murray Butler, president of Columbia University, seconded the motion vigorously?



(Louisville Courier-Journal)

"The country is indebted to the 67th Congress."
—PRES. HARDING.



The great loading racks at the new Sinclair refinery in East Chicago, Ill. This refinery is the terminus of pipe-lines from Oklahoma and Kansas fields.

Cutting Melons in the Oil Fields

What the stock dividends by leading oil companies really mean—and why they were earned

EVIDENCE has not been lacking recently of the prosperity of the oil business. The subsidiaries of the old Standard Oil Company are readjusting their capital issues to fit their tremendous assets, and one by one they have been declaring stock dividends of 100% to 400%. The Standard Oil Companies of Kentucky, California, New York and New Jersey led the way, and they have been followed, up to the time of going to press, by the Vacuum Oil Co and the Ohio Oil Co. with stock dividends of 300% each. Others were expected to make similar announcements soon.

The stock dividends were followed by increases in the market value of the Standard Oil stocks, for Wall Street believes that sufficient dividends will be paid on the new stock to substantially augment the total yield to present stockholders. The directors of the Standard Oil Co. of New Jersey, in announcing their 400% stock dividend, said that for the present the aggregate amount of the dividends would not be paid—and upon that news the stock reacted 25 or 30 points—but the directors of most of the companies have been silent. Even if the aggregate dividends were in no case increased, the companies would be in better positions because of the splitting of the present unwieldy shares into smaller units, and the readjustment of their capitalization.

Although the stockholders of the companies are not made a bit richer by the mere fact of the stock dividends, these "melon cuttings" are considered evidence of the great wealth of the companies, and are extremely favorable indications for the industry.

The *Boston News Bureau*, under the title "Bulging Treasuries," explains the situation thus, from the stock market point of view:

"Sometimes it is a 'steel' market; sometimes a 'motor' or a 'rail' or some other specialized kind of a market, according as trading fancy shifts. Now it is emphatically a 'Standard Oil' market. Each day has seen price movements that enhance still further the appreciation which dissolution seemed to confer on the components which made up the wicked Standard Oil of 1911. And the reason is not far to seek. It lies in a treasury opulence which corporate policy, income-tax possibility and bonus veto are bringing nearer to the "melon" stage.

"While the Standard Oils have radically changed their policies in recent years in the direction of attracting the investor by rearranging their capitalization to suit popular prejudices against high-priced stocks, and by furnishing a far greater amount of information regarding their affairs than formerly, they still stick to annual statements of income and resources. Thus we have no detailed information as to the condition of the big Standard companies later than December 31 last. They were then in tremendously strong condition, but it is a safe guess that their treasuries are still more replete with cash today.

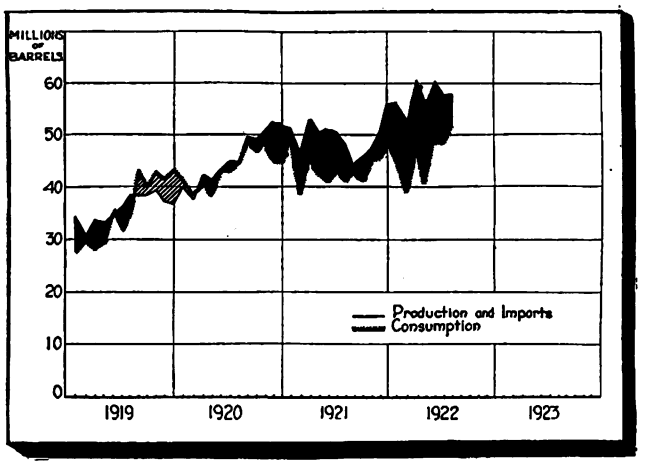
"Standard Oil of New Jersey is the giant of the group, as is befitting the parent of them all and the company whose activities literally encircle the globe. At Thursday's high prices the company was selling in the market for more than $1,122,000,000. Capitalization consists roughly of $200,000,000 7% preferred stock, callable at 115, and $100,000,000 common, par $25. On December 31 last the big New Jersey company had a surplus of $594,525,562. The book value of the common stock was $167.65 per share, comparing with a high of 222 Thursday. The stock market is thoroughly familiar with the ultra-conservatism of Standard Oil managements in valuing assets and sets its own valuations accordingly. Net working capital on December 31 was $386,790,430, equal to $97.90 per share of common.

"Since dissolution of the original New Jersey company in 1913, stockholders have received nothing in the way of extra disbursements except two rights to subscribe to preferred stock. Until now there have been no stock dividends and cash dividends have been paid regularly at the rate of 20% ($5) per annum without variation. Exchanging four shares of $25 par for each share of $100 par, as was done in 1920, did not affect stockholders' pocketbooks. The new stock has not yet reached the equivalent of the high of 910 reached by

accumulations do not call for sharp price advances—rather they call for efforts to hold prices down or to beat them down. And to the general market follower the spectacle of receding prices or of slow-moving prices is seldom given anything but bearish construction.

What Is Ahead?

"IN view of the present brilliant fulfilment of forecasts of those quarters which told that the oils were heading into the greatest of all booms for such stocks, the views which those houses and those people now hold as to what is still ahead for the oils would certainly seem worthy of consideration. Those quarters express the opinion that the boom in the oils is still in its early stages—that it can easily continue for several months more. They add that the main stimulus for buying of the oils in the near future is probably still to be afforded in the expectation of further distributions of large stock dividends by Standard Oil companies, and the expecta-



(Federal Reserve Bank, Phila.)

Supply and consumption of petroleum. The black area shows the excess of supply, represented by production plus imports, over consumption. Average monthly exports of crude petroleum are so small as to have no appreciable effect upon the surplus.

tions of similar distributions soon by some leading independent oil companies. A boom founded on such conditions alone, however, would probably have short life if there were not real indications that underlying conditions in the petroleum industry are such that a continued increase in earnings may be looked for so as to make possible the disbursing of attractive dividends on the vastly increased number of shares which will be afloat for the various big companies—in other words, an outlook for the oil industry to continue along the remarkable lines of expansion which have characterized its development over recent years, and made the present big stock distributions possible.

"The number of oil 'promotions' put out this year has been comparatively small. On the general enthusiasm developing for the oil stocks, such promotions are now beginning to make their appearance. Leading oil interests are hoping that the calibre of most of the new offerings representing the oil industry will prove much better than that of many of the recent promotion offerings representing other industries.

"The character of several of the latter offerings, as put out by some leading houses, has been poorer this year, discerning quarters state, than have been offerings by such important interests in a very long time, but the very heavy proportion of well-informed investors among the buyers of oil stocks who have been in the market until the past few weeks has not lent much encouragement to extensive offerings of new oil promotions, representing mainly speculative possibilities. Such style of promotions, particularly those representing the ill-fated Homer oil field of Louisiana, were somewhat common in the oil shares boom of 1919. The Homer field, with its early huge gushers, was expected to cover an immense area, but it narrowed down to small proportions. Its career, like that of the Toteco field and the Mexia field, revealed clearly how essential it is for the buyer of shares of a company representing a new field, with limits still undefined and whose main hopes are on that field alone, to realize that his purchases are speculative and not investment."

Cotton Goods in Great Demand

Both Northern and Southern mills are experiencing a boom in orders, and prospects are exceedingly bright

TEXTILES are better. That is the news which comes from New England. Business has been spotty for two years —profits have been negligible and the whole situation has been precarious for Northern mill-owners on account of competition with the Southern mills. Now, however, the demand is so great that even with the Southern mills running overtime, orders for Northern mills are pouring in. Naturally enough the reason for this is the public understanding of the fact that prices in general are slowly and steadily moving upward. For the last two years manufacturers would not make goods for stock because dealers and retailers kept buying from hand to mouth. Public consumption was low in view of the fact that prices were constantly dropping.

It is becoming more evident every day that cotton will eventually sell much higher. Spot cotton in New York recently cost 23c. a pound. Sales in all centres are higher and there is a keen demand for the raw staple in the South. The yarn market is coming back as well. For a long time there has been an overproduction of yarns, particularly the fabric suitable for automobile tires. The remarkable activity in the automotive industry has enabled manufacturers to work off this surplus and yarns are ready for an advance.

Automobile's Allied Industries

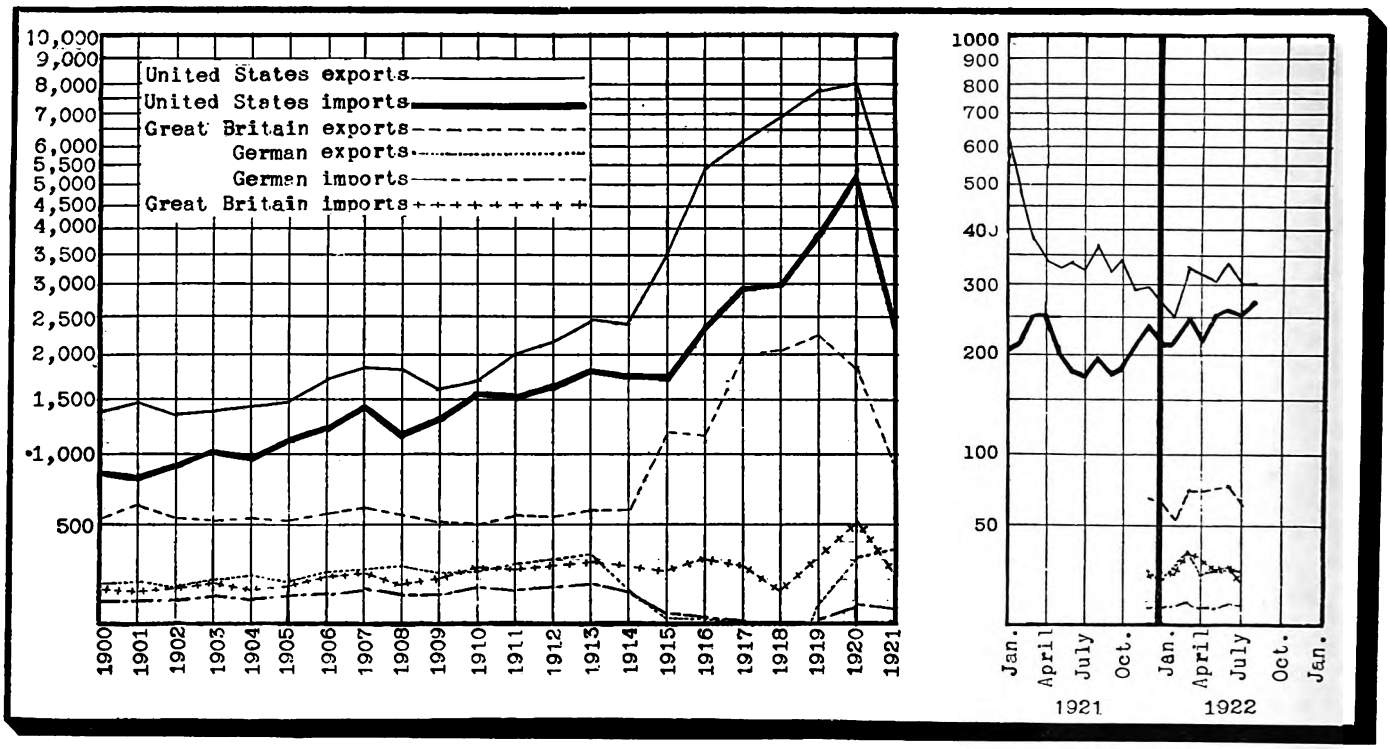
Nearly 2,225,000 workers and families are directly affected by the prevailing boom in the production of motor cars

AS an indication of the extent to which the automobile industry affects workers in other lines the following table from the *New York Herald* is based on the percentage of total output consumed by the automotive industry. This total does not include glue and curled hair factory employes, nor timber fellers, nor cattle raisers, nor other persons engaged in producing the primary materials, and yet nearly 2,250,000 workers and their families are directly affected by the present boom in this important interlocking industry:

Professional chauffeurs and drivers	1,200,000
Motor vehicle factory workers	256,000
Motor vehicle salesmen	106,000
Accessory factory workers	250,000
Garage employees	236,000
Tire factory workers	73,000
Tire dealers and salesmen	150,000
Iron and steel workers	33,000
Aluminum workers	5,000
Copper, brass and tin workers	3,000
Woodworkers	20,000
Plate glass factory employees	21,000
Tannery workers	8,000
Textile and leather men	15,000
Oil refinery employees	51,000
Paper composition workers	5,400
	2,431,400

New Daylight Lamp

AN artificial daylight lamp has been developed in England. The lamp is of the regulant incandescent electrical type, the light is reflected from a reflector which is colored with spots of certain shades. The resulting reflection is very much like ordinary daylight. The absorption of the yellow and red rays in the light produces a light of maximum clarity. A park was lighted with 60 of these lights and the effect was almost the same as if the sun were shining. The new lamps are purchasable on the English market at the present time.



Ratio charts of annual exports and imports of the United States, Great Britain and Germany since 1900, with monthly averages since 1921. Figures are in millions of dollars.

Can We Sell Our Surplus Abroad?

Who will buy our goods overseas?—What the "best minds" of the business world think about the future of our export trade

PLEASE take a good look at the chart at the top of this page. It may appear to be only a collection of scraggly lines, but it tells a story—and raises a question which closely affects your business. On the answer to this question will depend, to a large extent, the amount of business you can do in the next few years, and the prices you can get for your products.

The most interesting of the lines is the one at the top, which shows the fluctuations in the value of the export trade of the United States from 1900 to the present. The line starts low, and at 1914 it begins to go up fast. When it reaches 1920 it hits the ceiling and then takes a terrible tumble. It goes straight down until it reaches the part of the chart representing a few months ago, and then it begins to waver up and down. That's what the export trade of the United States is doing today: hesitating. . . .

Whether or not you make goods for the export market, the export market makes a difference to you. It has a big effect on the domestic trade for every commodity. During the war, and just after it, manufacturers of this country made a greater quantity of things than could be consumed at home. The foreign demand took care of the surplus. When the export market broke, at a time when the producing machinery was still keyed up to the wartime pitch, the domestic market also broke, and factories shut down. We are not trying to say that the breakdown at home was due to the breakdown in exports. Things are too complicated in this business world of ours for anyone to assign direct causes to situations which involve whole markets. But the two breakdowns came at about the same time, and there certainly was a connection between them.

Now American industry does not want to go back to the condition it was in before the war. It has to go ahead, not back. It is able to produce as much goods as it produced during the war and the post-war boom. But if it is to maintain that production it must have a big export market. Our manufacturers, if they are to produce heavily, must sell their surplus overseas. They can then make money on both the domestic and the foreign markets. If they cannot get foreign markets, they must cut down their production—as they recently have done—or they will lose money on the domestic market. And since prices and markets move together, one commodity affecting others in a way that must be described as "sympathetic," this applies to virtually all kinds of goods, whether they are exportable or not.

The question, then, which the chart raises, and the answer to which will affect your business, is this: Can we continue to sell a big surplus overseas? Will our export trade go up again as the world recovers, or will it drop back to where it was before the war?

The members of the American Manufacturers' Export Association are to hold a convention in New York City on October 25 and 26 for the purpose—among others—of considering this question. It is not possible for them, or anyone else, definitely to answer it. What they, and you, can do is to consider the facts and figures of our present export situation.

The export story is told in some detail in an article by Max Goldstein in *The Magazine of Wall Street*. Since 1914, the article points out, the export market has undergone such important changes that a return to foreign trade, as we knew it before the war, scarcely seems likely.

"The situation before the war," the article continues, "was, roughly, that we were increasing our export trade in two directions; exports of raw materials and foodstuffs, which

varied with the fluctuations of prosperity in the rest of the world, constituting the major part, and exports of manufactured goods, which were gradually increasing in importance and were the most desirable part of the trade.

"Cotton and wheat were the basis of our foreign balance, which amounted roughly to a half billion dollars a year. There was a widespread tendency to establish manufacturing branches for the European trade, close to the centers of consumption, to take advantage of lower operating costs and eliminate freight charges.

"With the war came an enormous speeding up of foreign trade all along the line. In the first period, from 1915 to 1917, after the world had begun to recuperate from the shock of realizing it was actually at war, and was making strenuous efforts to win, there were three classes of export goods that benefited extraordinarily—foodstuffs to replace the production of men at the front, materials useful for warmaking, ranging from raw cotton to finished shells, and commodities "non-essential" in the military sense for which we had a free field in the great export markets of the East and South America, now that our older competitors were too busy fighting among themselves to do any business with them."

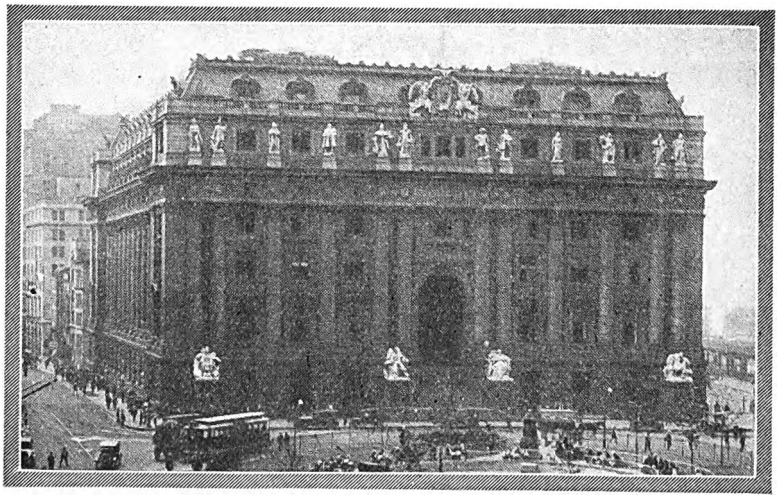
Immediately after the war, when the stocks of the world were exhausted, the rest of the world began frantically to buy the materials of peace from us. Mr. Goldstein further says:

"The shelves emptied during the war were replenished, former enemies readmitted to trade with their currencies, and hence their purchasing power in the world market, on a relatively high basis, and the industries as they restarted one by one clamored for raw material more and more as the stocks of Government war supplies were progressively exhausted.

"This marked the peak of our export status. In 1919-1920 we were in a position where we could sell to the world at large anything we could produce, just as they were in a position to buy anything we could sell. Raw materials and finished products, necessaries of life and rank luxuries, all crowded toward the outlets of foreign trade until our port facilities were strained to the utmost and the huge shipping which we had built up during the war was called upon to the last ton to help move the cargoes.

"At that time we were the only great producing country whose resources had not been seriously damaged by the war; in fact, the war by decreasing our productive capacity in many branches of industry had created the necessity for a big export trade to drain off the excess production which the home market would not absorb.

"With the close of this period of artificial prosperity, undiscriminating and extensive, came the real test of our export trade. As a result of our peculiar political and economical position since 1914, we had conquered certain export markets hitherto closed to us, notably South America, certain of the European neutrals, and the Orient. We had gained a foothold in many branches of the European market which had hitherto been held by the great belligerents, England, France and Germany. The question now was how these markets would stand up under the strain of the wave of depression and readjustment that started in America and spread over the whole world.



The Customs House in New York. This clearing house for import duties is the greatest collection agency of its kind in the world.

(© Galloway)

Our Exports Show Steady Decline



"THE gross results in themselves, even without further analysis, are interesting. They show that where our export balance before the war amounted to roughly 500 million, in the peak year ending June, 1920, it was 2870 million, the following year almost as high at 2862 million, but by 1922 it had declined to 1162 million.

"Considering the exports alone, we find they ran to about 2 1-3 billion before the war, over 8 billion in 1920, 6½ billion in 1921, and 3¾ billion in 1922. *With all due allowance for the price deflation which characterized parts of the last two years, the steady decline of our export trade toward normal figures is evident."*

During 1921 and the present year, as the chart shows, exports have greatly declined. Still, there are encouraging sides to the picture. The proportion of manufactures in our total exports was largely increased during the war, and during the let-down period it held up pretty well. In 1921 finished manufactures formed a larger percentage of our exports than in any pre-war year, and their value, according to figures compiled by the National City Bank, was more than double that of any year before the war.

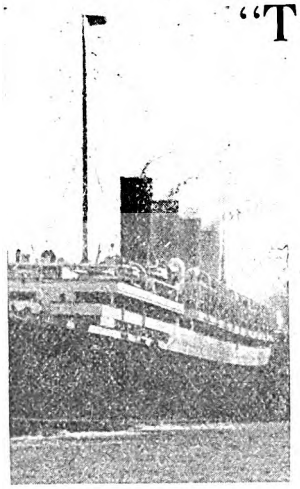
These goods for the most part went to non-manufacturing countries, in South America, Asia, Oceania, and Africa, and to Canada and Mexico. They constituted 37% of the total exports of the last year, whereas similar articles constituted only 31% in the fiscal year 1914. Although the prices for the larger part of the exports in 1921 were greatly reduced, the total volume of finished manufactures sold abroad during that year was $1,625,000,000, whereas for the fiscal year 1914 it was only $725,000,000.

"These figures," says the *Exporters and Importers Journal,* "furnish practical evidence that goods made in the United States are well-liked in foreign markets and that our manufacturers are sending to them an increasing proportion of their products. In fact, basing the statement on census figures, the percentage of growth in exports of manufactures is much greater than the percentage of increase in production.

"Those familiar with the situation realize that American manufacturers are taking an increased interest in the opportunities for the sale of their products offered in foreign markets. Means of transportation have improved greatly during the past few years and there has been a reduction in freight charges. This, with reduced railroad rates from inland points of production to the seaboard, are in favor of the expansion of foreign trade and encouraged the interest of manufacturers in its opportunities. There has

also been a decided improvement in banking arrangements with foreign countries, whereby the transaction of financial business has been greatly facilitated and credits have likewise displayed marked improvements.

Foreign Trade Conditions Are Encouraging



"THE foreign exchange situation, it is true, is a serious stumbling block in the extension of foreign business and tends to discourage many American manufacturers who would otherwise be inclined to venture into overseas markets. But in the countries with which the largest and most dependable business is transacted with the United States the situation is steadily clearing and the complete removal of this obstacle is only a question of time.

"The situation altogether is one to encourage American manufacturers to seek business in foreign countries. Their goods have proved satisfactory and in many instances superior to those offered by competitors while their prices, quality considered, compare more than favorably with those of rival traders. The development of our foreign commerce is largely a matter of enterprise, and in this respect our exporters should be quite capable of holding their own in any market. It is a question chiefly of bringing their goods, their prices, etc., to the attention of the foreign buyer and in this, the methods they have successfully followed in the establishment of their home trade, advertising, personal representation and conscientious care in the filling, packing and shipment of foreign orders, will invariably produce the desired results. The business is there for those who will seek it, as the figures above quoted sufficiently prove."

The proportion of manufactures in our exports for this year dropped slightly, but still showed strength. The figures for a list of 22 articles shows a decline from 1921 of $35,282,643, or 31%, for the first seven months of 1922. The general list of exports declined 26%. *The Wall Street Journal,* analyzing the monthly figures of the Bureau of Foreign and Domestic Commerce, says that the bulk of the manufactured exports—as contrasted with their money value—is as large as that of 1921. Of 191 comparable articles, nine show gains in bulk which more than offset the decline in the remaining ten.

"Heavy inroads of competition plus lessened demand especially mark trade in footwear and electrical supplies and numerous specialties," says *The Wall Street Journal.* "Heavier increases appeared in sales of cotton apparel, automobiles, pianos, phonographs and radio equipment.

"Comparison of quantity with value declines shows that on an average American manufacturers and exporters have satisfactorily readjusted prices to changed foreign market conditions.

"Here follow leading exports of advanced manufactures for seven months of 1922 and 1921:

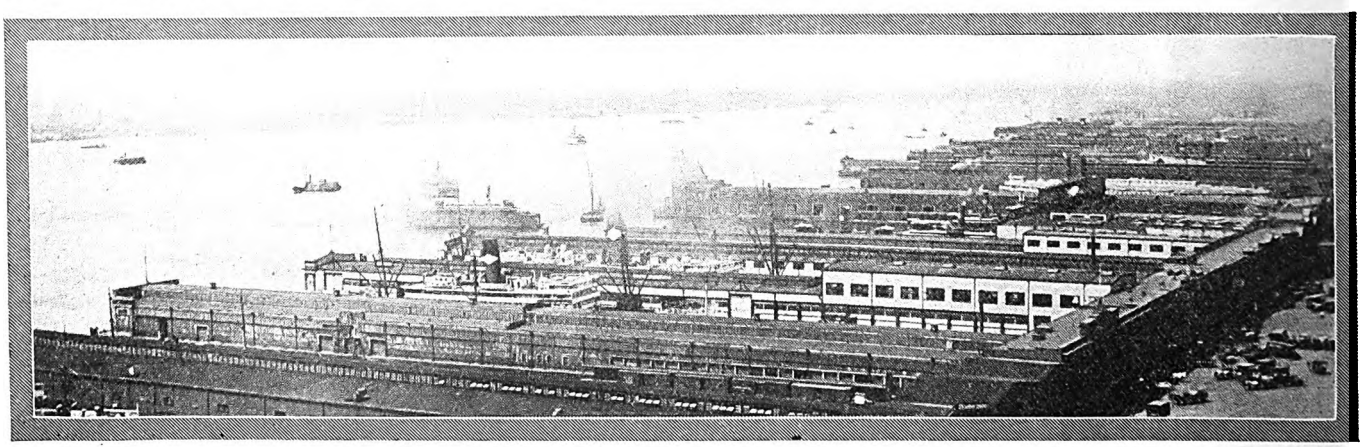
Seven months	1922		1921	
	Quantity	Value	Quantity	Value
Boots and shoes, pr..	2,984,029	$6,672,067	6,271,239	$18,348,147
Rubber boots, pr.....	140,867	386,854	1,795,985	2,027,533
Cot. hose, doz. pr....	2,712,009	5,196,439	1,580,881	4,245,430
Newsprint, lb.	34,250,768	1,526,584	21,779,115	1,568,088
Plate glass, ft.....	1,859,096	795,165	1,557,659	990,406
Sta. engines, No.....	403	317,189	421	872,241
Locomotives, No.....	227	5,471,714	692	21,621,713
Auto engines, No....	33,975	3,975,086	5,812	1,195,920
Elec. fans, No.....	48,771	548,518	57,423	1,128,803
Elec. lamps, No.....	3,099,304	765,206	9,415,188	2,765,641
Cotton looms, No....	797	204,035	737	272,910
Sewing mach., No....	101,535	3,468,550	...	4,771,646
Calcul. mach., No....	5,771	993,578	9,424	2,127,844
Cash registers, No...	7,736	1,547,260	7,041	1,721,121
Typewriters, No.....	109,808	6,807,159	...	8,689,946
Typesetting mach., No.	1,135	2,253,640	...	5,794,320
Automobiles, No.....	42,362	33,049,041	24,558	30,041,421
Exp. mov. films, ft...	74,916,254	3,539,097	89,075,499	4,106,647
Pianos, No.....	6,146	1,757,637	4,834	1,834,768
Organs, No.....	724	73,526	785	102,489
Phonographs, No.....	28,042	1,001,020	22,757	1,084,195
Fountain pens	76,272	69,090	134,112	187,869
Total.....		$80,216,455		$115,499,098

With what countries should we seek to develop our export trade? Where have we the best chance—in Europe, in the East, or in countries on our own continent?

Max Goldstein's article in *The Magazine of Wall Street* presents an excellent analysis of the volume of our trade with various countries.

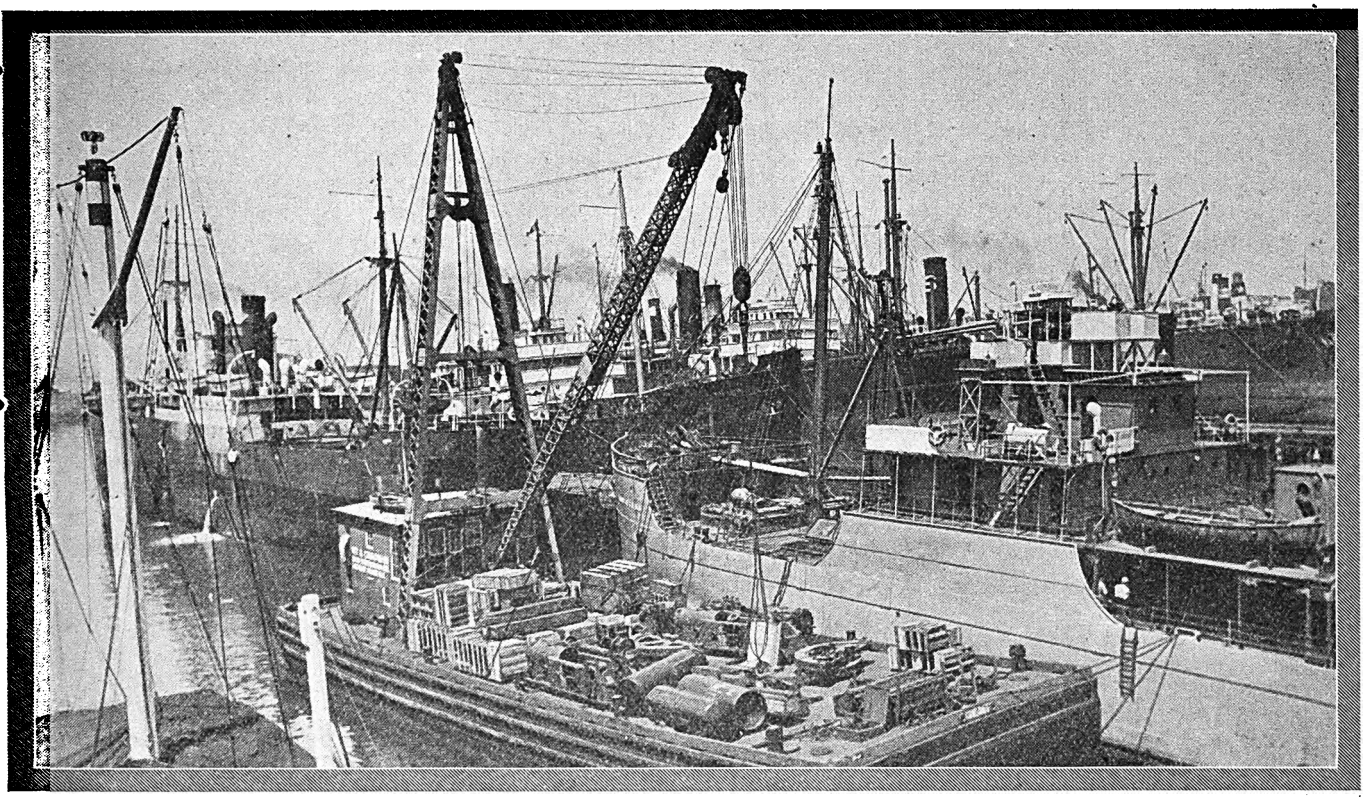
"In 1913 there were five countries with which we did an export business amounting to more than 100 millions annually. They were France, Germany, Holland, the United Kingdom and Canada. In 1922, every one of these countries bought more from the United States than it did before the war. In addition the following countries bought over 100 millions' worth of merchandise from this country in 1922: Italy, Mexico, Cuba and Japan, while Belgium and China came fairly close to the 100 million mark.

"As the foregoing figures indicate, the average increase of our exports for 1922 over 1913 amounted to 50%. For most of our larger customers the increase over 1913 ran close to the average percentage increase, with a few points difference either way. One significant exception, however, stands out: Germany, to whom we sold 314 million dollars' worth of goods in 1913 and 322 million in 1922. Had Germany fol-



(© Underwood)

Some of the large piers on the Hudson River side of New York, from which is loaded much of the freight that clears through the principal port of the Western hemisphere.



(© Galloway)

Crowded quarters at Erie Basin on the Brooklyn side of New York harbor, where hundreds of ships are loaded and unloaded every month.

lowed the average percentage increase the exports in 1922 would have amounted to 470 millions, and our export balance would have been greater by 148 million through sales to this country alone.

"The reasons for the decline, relatively if not absolutely, in the exports of the United States to Germany are not far to seek. The decreasing purchasing power of the mark has put up a barrier to imports of American products more effective than any tariff wall, and under the conditions American finished goods were the first to go. Such products as agricultural machinery, tools, typewriters and cash registers, which we had formerly sold in large quantities to Germany before the war, are now manufactured, of poorer quality, in Germany. On the other hand, our sales of wheat and flour, cotton and copper show but slight declines if any from pre-war levels, and because of the remnants of price inflation are selling for more, thus giving the slight increase over pre-war values noted above.

"To a greater or less extent the same may be said of all our former large European customers. This continent regularly takes from 50% to 60% of our total exports, and in general terms it may be said that our exports to Europe tend to consist of raw materials to a greater extent than before the war, owing to the inability of the population to purchase relatively expensive foreign finished goods which might be manufactured at home.

"The future of our export trade would therefore seem to consist in developing our non-European markets. We can sell them finished products rather than raw materials, because their industry as a whole is not developed to a point where it can absorb any great part of our production of such goods. Foodstuffs also are grown usually closer to the centers of consumption than we can compete with, considering the great wheat belts of Argentina which supply the South American market and of India which supply the East.

"In selling finished goods to the other continents, however, we run into the severest of competition with European industrial countries which are engaged in precisely the same effort. How we have met the competition in Asia and South America is told by our export figures for 1920-1922.

"As to South America, we find that whereas our total exports declined 20% between 1920 and 1921, our sales to this continent actually increased from 490 million to 523 million, or about 8%. In the following year, however, with a total drop of 38% in our exports, the decline in American sales was from 523 to 190 million, or 64%. While the general depression that prevailed over South America was largely responsible for this, and with prospects of improved conditions in the rubber, coffee, wheat, meat and leather markets exports should increase, it is difficult to avoid the conclusion that we have missed our chance to retain the South American market that we had all to ourselves during and for a short time after the war.

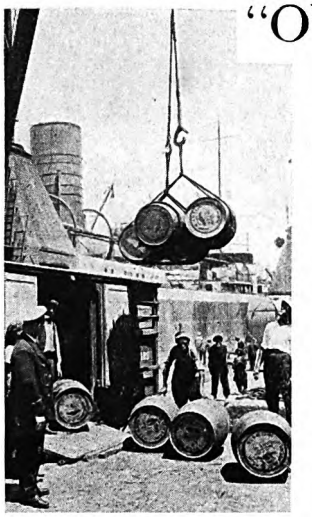
"Quite the reverse is the situation of our export trade with Asia. While the decline from 1920 to 1921 amounted to over 30% as against a general decline of 20% in the following year the decline was slightly over 11% when the general decline ran at 38%. Our increasing strength in Asia in the face of severer competition has done a good deal to improve our export showing for the year.

"Even more remarkable is the improvement of our trade with the Orient, considered country by country, compared with our trade before the war. Japan, which bought 233 million dollars' worth of goods from us in 1922, bought not quite 55 millions in 1913. In the year ending June, 1922, China bought from us nearly 90 millions' worth of goods, and since then has been buying at the rate of 100 million annually. In 1913 China bought from us only 18 millions' worth of goods, and it must be remembered that one of the great items of the Chinese import list, railway equipment, is still closed to us because of our lack of participation in Chinese railway development. Just as significant is the development of our trade with British India, which at 32 million in 1922 amounted to more than three times the exports for 1913.

"In North America, Canada takes well over 50% of our exports. Here we find exports practically the same in 1921 as in 1920, with a drop of 45% in 1922. We are losing ground in our exports to Canada, while gaining in Mexico, to which we exported 128 million dollars' worth in 1922 and 51 millions in 1913.

"In the case of both Australia and Africa we find slight increases in 1921 over 1920, with heavy declines in 1922. Taken together, however, they do not make up 4% of our total exports, nor is much progress in this line likely for the near future.

European "Neutrals" Offer Good Markets



"OUR relations with Europe, apart from the great Powers, provide one promising field where the American export trade has apparently made good the gains it won since 1914. This is the group of European neutrals whose exchange stands high in the world's markets and who consequently have a relatively large buying power.

"Denmark and Spain, for instance, bought twice as much goods (measured in dollars) in 1922 as in 1913. Norway bought over three times as much, Sweden about 2½ times as much, while Switzerland moved up from $777,000 to $4,641,000. An anomalous situation, however, is that of Holland, which at $130,000,000 is but slightly above the 1913 figure of about $120,000,000. Even with this country, however, there are indications of improvement, and it is likely that 1923 will close with an export showing of some 160 million. Greece bought in 1922 over 10 millions of goods compared with one million in 1913.

"In these 'neutral' countries the situation is the reverse of that obtaining in the former belligerents. High exchange in most cases and comparative prosperity have given them the means of purchasing American finished products which have gone to swell their importations, and this field also we may regard as conquered for good.

"Absolute declines in the value of our exports are shown in the case of Brazil and Chile, showing how loose has been our grip on the rich export field of South America."

The markets in which we may expect big trade in the future, in the opinion of many persons, are in Latin America and Asia.

According to Dr. Julius Klein, the director of the Bureau of Foreign and Domestic Commerce, our export business is gradually shifting from Europe and Asia to the nearby countries of the New World, and to the Far East. At the annual meeting of the Associated Business Papers, Dr. Klein said:

"Though the absolute values of our shipments across the Atlantic will undoubtedly continue for years in excess of the pre-war figures, the relative importance of markets outside Europe is steadily increasing."

As evidence of the shift, Director Klein pointed to the fact that during the three fiscal years immediately preceding the war Europe took an annual average of 61.2% of our exports. The peak of her relative importance as a market for American goods was reached in 1914-15 with a record of 71.2% of the total. "There has been a progressive decline in the relative importance of Europe as an export market since that time," he said, "her average annual proportion in the three years' period ending June 30, 1922, having been 55.7%."

Turning to our neighbors to the North and South, Director Klein declared that "our sales to Canada, Mexico, Cuba and other North American countries averaged 23.6% during the fiscal years 1912-14, inclusive, fell to about 18% during the war, and since 1918 have returned to 23%, with evidence of a definite advance in the future.

"South America is also improving," Dr. Klein asserted, "though not quite so rapidly. Her post-war share averaged 6.4%, as against 5.4% before 1914, though the former figure was drawn down by an abnormal drop in the 1921-22 percentages.

"The most significant progress, however," the Director said, "may be looked for in our Transpacific markets. Their share of our sales during the three years just before the war averaged 4.9%, and since then have gone forward to a post-war average for 1919-22 of 10%, reaching 11.7% in the fiscal year which has just closed."

What of the future for our export trade? It is at a low ebb now, compared with the heights which it reached during the war and just after. It has remained at about the same level for several months, as if it were hesitating whether to go up or down. Will it turn upward again?

The American Manufacturers' Export Association has asked its members if they thought export business was picking up. Most of them replied in the affirmative, and with great optimism. Here are a few typical statements:

Leather Belting

Belting & Leather Products Association, Inc.

"Since the first of this year our trade on leather belting has increased for export gradually, month by month. The figures for 1922 up to the present time show up much better than those for the same period in 1921, and we look forward to increases all of the time from now on.

"Several of the markets that have been dull in regard to the purchasing of our commodity are now picking up, and everything points to the fact that by the beginning of the coming year we should be receiving some very good business in our line.

"While prices have the tendency to advance, we find no change in the amount of the purchases from the different countries where there has been a sign of opening up in trade. Altogether, there is a very bright outlook."

(Turn to page 1793)



Russia's Industrial Outlook

New York banker tells about Soviet activity, particularly in the steel trades

THOMAS W. LAMONT, speaking before the American Bankers' Association convention, said that the Russian situation would be greatly improved when the Soviet Government could persuade foreign engineers, manufacturers and other technical experts to enter Russia and take in hand various units of production and transportation.

According to Soviet official periodicals received by the Department of Commerce, the steel industry of Soviet Russia is improving to an extent which indicates that Mr. Lamont's prophecy is being fulfilled.

For example, the production of pig iron in the three principal metallurgical regions of Soviet Russia for the first six months of 1922 increased 51% over the corresponding period of 1921, a total of 5,401,000 poods (87,100 long tons). The year's output in the pre-war year of 1913 was 257,000,000 poods (4,145,000 long tons). The three districts also produced, according to the Soviet papers, 9,963,000 poods of open-hearth ingots and 7,646,000 poods of rolled steel."

And the output of the Gomza State Syndicate Engineering and Machine Works, which represents a combination of 11 great steel works in Central Russia and has a total capitalization of 69,730,000 pre-war rubles, amounted, "during the first six months, to about 10,000,000 gold rubles (about $5,000,000). Of this amount 2,500,000 rubles represented locomotive construction. The number of broad-gauge engines turned out was 22, and of narrow-gauge 14, while 27 locomotives underwent capital overhauling. Freight-car construction was accomplished to the value of about 1,000,000 pre-war rubles, the output consisting of 240 new cars and 831 overhauled. Production for the war department was about 2,200,000 rubles gold."

Mr. Lamont also said that foreign merchants would open up a more active trade (not necessarily direct with Russia, which seemed impossible for the moment) but with the buffer states like Latvia, Esthonia, etc., whose merchants know Russia perfectly, having formerly been a part of it; and in return for shipments of goods into Russia they could secure payment in ways not open to the ordinary foreigner.

And the *Wall Street Journal* states that exports to Russia from the United States in July and for the first seven months of 1922 were in excess of similar periods in 1913:

"The Ukraine, Latvia, Esthonia and other new states out of old European Russia, together imported from United States in seven months of 1922, goods exceeding $15,000,000, against exports of more than $1,054,259 to us. These new states' imports direct from the United States added to those of the present Russia reach almost to $30,000,000 for seven months, or $5,000,000 more than in the whole year 1913."

Exports to and imports from European and Asiatic Soviet Russia follow:

July:	1922	1921	1913
Exports	$1,549,376	$515,670	$1,436,867
Imports	6,870	.....	1,400,297
Exports balance	$1,542,506	$515,670	36,570
Seven months:			
Exports	$13,545,106	$13,118,871	$13,045,517
Imports	36,837	693,934	14,145,226
Export balance	$13,508,269	$12,424,937	*$1,099,709

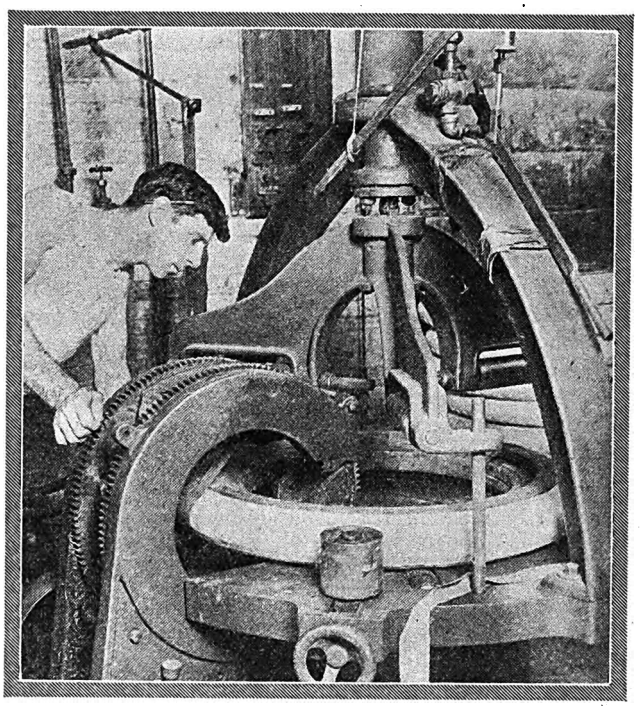
*Import balance.

Russia imports food heavily, and some coal, textiles, metals. In the first six months of 1922 her imports, most of these from England, were worth $12,051,000, at current exchange of British bills at New York. On the export side a better showing was made. The total, principally of timber, furs and benzine, was $6,644,000 at current exchange.

Tire Prices to Advance

Manufacturers have recovered from their gloomy feeling and are optimistic

WHEN crude rubber hit a low price of 14c a pound during the midsummer, the outlook for various tire and rubber companies was gloomy indeed. In less than three months prices have appreciated more than 50%—crude rubber selling as high as 23 cents a pound on the open market. This, of course, is the result of the British Government's decision to enforce restriction of crude rubber production. The effect of this policy has been to change the atmosphere in the rubber industry from one of gloom to one of excessive optimism. Very naturally, the first reaction will be an advance in tire prices. Competitive conditions have forced prices down until they were, on October 1, about the lowest in history. Few companies were making any money. At that time the best that could be looked for was an advance in the spring.



(© Underwood)

Wrapping an automobile tire with fabric preparatory to vulcanizing.

But now earlier action seems probable. According to the *Boston News Bureau,* the benefit to tire companies from inventory appreciation is likely to be overemphasized.

"Earlier in the year most concerns had thoroughly cleaned up old stocks of high-priced rubber and were buying in the current market on a minimum requirement basis. Some companies now boast that they have substantial stocks at prices averaging below 15 cents.

"Dealers and importers who are in position to know the real inventory positions of large consumers say few companies have sufficient rubber on hand or contracted for at recent lower prices to make possible any substantial appreciation in inventories.

"It is estimated that in first six months this year about 100,000 tons of crude rubber were used in manufacture of tires in the United States and approximately 25,000 tons more went into other products, including mechanical goods, footwear, etc. At beginning of July there was in hands of manufacturers less than 60,000 tons. An advance of five cents a pound would be equivalent to an appreciation of $6,000,000 in value of rubber in hands of all manufacturers. Dividing this among more than 200 manufacturers would give an average of less than $30,000 for each concern."

Look Out for a Traffic Tieup

Freight car shortage is becoming more serious as winter approaches—steel and lumber industries already affected

SOMETIMES the dope is right. The recent world's series, by upsetting all prophesies, led to a general impression that there is no use in trying to figure things out in advance. But you really can tell something from the figures in some cases.

One of those cases is the railroad freight situation. A long time ago, when a lot of idle cars were scattered all over the countryside, it became apparent from certain considerations that there was going to be a freight tie-up this fall. Here we are coming into November, and, sure enough, the freight tie-up is with us. It doesn't amount to anything like paralysis, but it's getting pretty uncomfortable, and it will doubtless be worse before it gets better.

The demand for freight cars is normally bigger in November than in any other month. Roger Babson has figured out the average decrease in car supply between September and November, and he says, assuming that the decrease this year will be an average, we should expect a net shortage of almost 90,000 cars by the first of next month. He adds:

"When you remember that an unusual number of locomotives will be required for coal transportation, together with the fact that repair work on all equipment is far behind, owing to the strike, it is clear there is trouble ahead. Certainly more than the usual seasonal congestion in transportation must be anticipated. If an early winter sets in this shortage will become acute."

It is fairly acute already. By September 15 the traffic demands of the railroads had absorbed all surplus cars. During the week ending on that day the railroads had pending requests from shippers for 85,906 freight cars which could not immediately be filled. The principal demand was for box cars.

By September 30 it began to look as if records for heavy traffic were about to be broken. The total loading of all commodities in the last week of September was 15,090 cars in excess of the preceding week. It exceeded the same week last year by 83,550 cars and was only 3,902 cars short of the corresponding week in 1920, the year in which the railroads hauled the heaviest traffic in the history of the country.

Complaints of the freight tie-up are coming in from all sides. The roads in the West, which have suffered more than those of the other sections from all the recent transportation troubles, seem to be hit the hardest. A Chicago dispatch to the *New York Evening Post* says:

"Traffic on Western railroads is as heavy as the carriers can handle with their present car, power, trackage and terminal facilities. Until all are greatly increased, especially the number of cars and locomotives, the business of the country will be affected when it is near the peak.

"Cars are scarce on all railroads, and to meet the demands of grain shippers who have their elevators full in western Iowa and in Nebraska, empty box cars are being taken from the States east of the Mississippi River and moved west of the Missouri River, some going to southern Colorado, where there is an urgent call. The business of the country is suffering for want of transportation facilities and there are no immediate prospects of general relief.

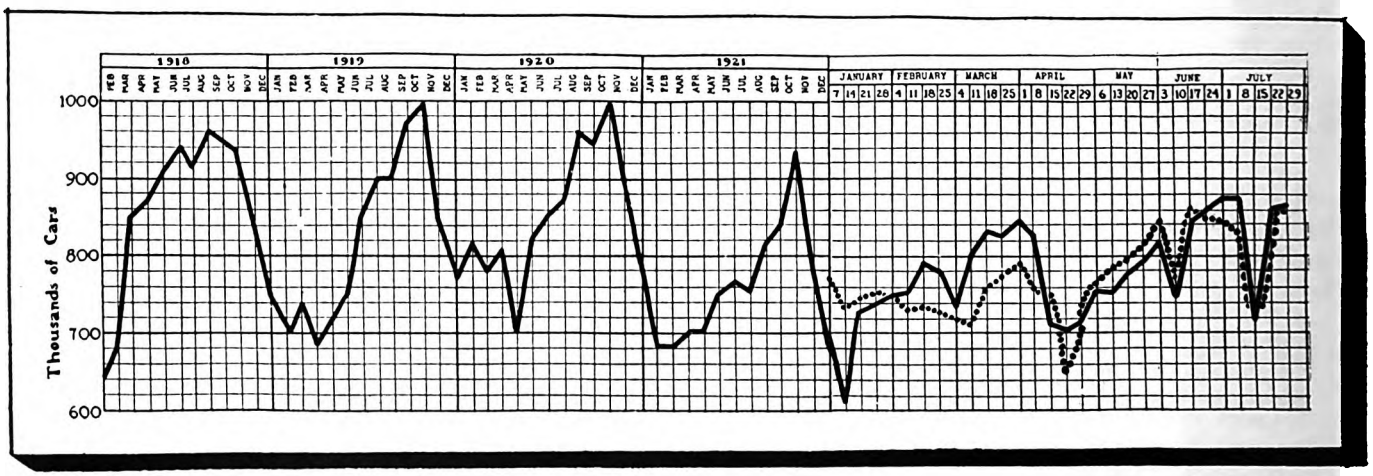
"There are embargoes against shipments of grain, feed and merchandise to Duluth and Superior over the Soo Line, and also embargoes in Wisconsin against shipments of potatoes to Chicago and other classes of freight to various points."

Julius H. Barnes, president of the United States Chamber of Commerce, led a broad discussion on the inadequacy of our transportation facilities at the National Conference of Business Paper Editors.

"Transportation facilities today in the United States are totally inadequate," said Mr. Barnes. "From September 1 to October 1, in the height of the crop-moving period, the main channels from Buffalo to New York virtually were closed. The four great trunk lines did not move any grain. It was received from the West until it exhausted the elevator capacity of Buffalo—18,000,000 bushels. Lake rates rose from two cents a bushel to six cents because of lack of cars.

"The water route from Buffalo to Montreal is equipped with the facilities of forty years ago. It will accommodate vessels of not more than 250 feet length, while the lake carriers are 600 feet long. The Buffalo to Montreal grain rate thirty days ago was six to seven cents a bushel; last Saturday it was fifteen and one-half cents a bushel. This was the influence of the pressure of the grain west of Buffalo seeking an outlet to foreign markets. Foreign prices advanced sixty-five cents a bushel. The spread between the ultimate foreign price and the farm price was between ten and fifteen cents a bushel.

"The value of 4,000,000 bushels of grain in the United States is at least 12% below the European markets. That situation, if it extends throughout the year, will mean a loss of $400,000,000. That is the minimum loss in farm spending



(A. B. P. News)

This graph shows number of freight cars loaded from January 1, 1918, to latest period available. The weekly loadings are averaged for each month up to 1922, but are shown weekly since January 1 of this year. The broken line is an average of the two previous years, which may be used for comparison with current conditions.

power and its influence will be felt by the other industries of this country.

"It is due to an over-rigid policy of regulation over our railroads in the last ten years. The earning power of our railroads has been destroyed and their credit has been undermined so that they cannot maintain their equipment and keep it up to the expansion of this country."

Various industries are issuing loud complaints about the freight tie-up. The lumber trade seems hardest hit of all. The Southern Pine Association complains that the situation is worse than it has been at any time during the past eight years. The mills have received cars enough for only 30% of their requirements.

Embargoes, according to *Dow Service Daily Building Reports,* are seriously upsetting the building trades. Some persons think that the construction industry will again have recourse to the tactics pursued during the war, when great caravans of trucks were used to carry basic building materials for long distances.

In the iron and steel trade papers the headline constantly recurs: "Car Shortage Checks Production." Undeliverable steel has been piling up in many plants for some weeks. Occasional reports are issued announcing that the situation is somewhat relieved, but the tone of most utterances in the trade press is one of complaint.

What are the railroads doing to help matters? Whatever one may think of their general policies, and of the conditions which make possible tie-ups such as this, one cannot question that at the present time they are moving freight as fast as they possibly can. The car service division of the American Railway Association is conducting a campaign urging shippers to help by loading each car as heavily as possible. The Association says in a circular:

"It is extremely important from the standpoint of shippers as well as the railroads that extraordinary methods of cooperation be adopted along the following lines in order to measurably meet the transportation needs, particularly of the next few months:

"1. Load cars to their full carrying capacity. Figures show that 2,250,000 less cars would have been used during the year 1921 to handle the same amount of tonnage, provided the cars had been as heavily loaded during the entire year of 1921 as they were during the last quarter of 1920. The light loading of equipment constitutes a very great waste in transportation, including the addition of empty mileage for the return of the excess cars in service for handling the same tonnage.

"2. Unload cars promptly. Save car days. At least 150,000 cars are unloaded every week day. If twenty-four hours can be saved in more promptly unloading one out of every ten cars placed for unloading there will be 15,000 additional cars available for shippers. The railroads do not want demurrage.

"3. Order cars in advance, and on a basis of what will be loaded within a twenty-four-hour period. Do not hold cars for prospective loading. This will be helpful in having requirements met and will conserve equipment available for general distribution. It helps no one to pyramid orders and disrupts efforts of car distributors to meet demands uniformly.

"4. Place orders requesting 'reconsignment' with promptness. It is easily possible to avoid at least two days' delay in car movement by this means.

"5. Issue bills of lading promptly. Freight cars are built to haul goods, not to store them. They should be loaded to the limit of their capacity. They should be loaded and released with the utmost promptness.

"By cooperating in carrying out these suggestions all will be contributing in large measure to the meeting of current transportation requirements."

"Roads Able to Handle Freight," Say Executives

AS the railroad traffic jam gets worse, many persons are calling into question the efficiency of the railroads, and their ability to satisfy the transportation needs of the country. In defense of the railroads, a representative of the Association of Railway Executives has prepared the following statement for **The INDUSTRIAL DIGEST.** He presents therein the facts and figures which lead him to believe that the roads are functioning well:

What the Railroads Are Doing

"THE history of traffic in this country has shown that it almost invariably attains its highest point or 'peak' in the fall. That is the period of the heaviest grain movement, the heaviest coal movement and even of the heaviest movement of other products.

"Three of the five weeks in which the railroads have loaded more than 1,000,000 cars have fallen in October. It is this autumn rush which produces a temporary 'car shortage.'

Conditions Peculiar to 1922

"CERTAIN causes have been operative this year which did not exist in previous years, and this year there have been three important factors all operating at the same time, to make the traffic problems of the roads unusually difficult.

1. The 5 months' strike in the bituminous coal fields.
2. The 5 months' strike in the anthracite coal fields.
3. The railroad strike which began July 1, the effects of which will be felt for many months beyond its actual cessation.

"The ability of the railways to supply adequate transportation to meet these unusual demands—including the necessity of making up the deficiency in coal movement due to the miners' strike—has been questioned in some quarters. The best answer to the questionings and the best promise as to what the roads will do, are found in the record of what they are doing.

"A brief consideration of what has been done with the various classes of traffic is seen from the reports of the American Railway Association:

Year's Traffic to Date

"THE record of railroad achievement for this year is notable. From January 1 to September 30, 1921, the railroads of the country moved 29,155,147 freight cars loaded with all commodities. For the same period this year they moved 31,671,396, an increase of 2,516,249 cars, or almost 10% compared with last year.

"The volume of freight which the railroads have been moving since the conclusion of the coal strike in response to the heavy demands made upon them not only for the transportation of coal, but for all other commodities, is seen in a survey of the recent reports of the American Railway Association and other organizations whose function it is to keep informed on traffic matters.

Within 5% *of Records*

"FOR the week ended October 14 reports show that more cars were loaded with coal during the week than in any previous week since April 1, the beginning of the strike. The total was 220,751 cars, which is within 5% of the greatest number ever loaded (week of November 2, 1920) in the history of the roads.

"The movement of coal to the Lakes also shows an enormous volume. For the third successive week more than 1,000,000 tons of coal have been dumped in a week at Lake Erie ports for re-shipment to the Northwest by boat. The total dumped at Lake ports for the week ending September 23 was 1,219,000 tons, or more than 20% in excess of the amount the Federal



(Atchison Globe)

He can't please both at the same time.

fuel distributor has stated is necessary for the railroads to move per week to insure an adequate supply for the Northwest this winter. In addition to the coal actually dumped last week there were 1,149,000 tons of coal that had either arrived at Lake ports or were within 48 hours of their destination.

Coal Traffic

"FOR example, for the week ended September 30 the railroads of this country moved 189,349 carloads of coal—an increase of 8,995 over the same week last year.

"According to records of previous years a comparative study of the movement of soft coal in September of last year compared with this year, shows that the average amount of soft coal moved per day in September, 1921, was 24,557 cars, while this year it has been at an average of 29,291 cars, which is an increase of nearly 5,000 cars per day, or 20%.

Grain

"GRAIN receipts are running at a record level. According to a report of the *Chicago Tribune,* grain receipts at Chicago for the week ended September 30 were 8,187,000 bushels, 76,000 bushels in excess of the previous week, 711,000 bushels more than last year, and 841,000 bushels above the five-year average for the same period.

"Primary receipts were 30,508,000 bushels, the largest at this time in more than five years, exceeding the average by practically 4,000,000 bushels and showing an increase of 605,000 bushels for the week and 5,854,000 bushels over last year.

"Wheat and oats receipts were the largest at this time since 1918 and corn the heaviest in five years, with the exception of last year.

Fruits and Vegetables

"THESE shipments are also at a level for the year to date far above that of last year. According to a report of the Department of Agriculture, dated September 30, 333,370 carloads of fruit and vegetables have been shipped between the first of the year and the week ended September 23. In the same period last year only 288,403 cars were shipped.

"The above figures for fruit and vegetable shipments represent carload lots. The American Railway Association reports that the total of all fruit and vegetable shipments including less than carload lots for the year 1920 up to the end of September was 408,403 cars; in 1921 it was 514,000 cars, and for this year 555,423 cars, or more than 30% above 1920, and 10% above last year.

Livestock

"THE movement of livestock shows a substantial increase over that of last year. In September a year ago 114,840 cars were loaded with livestock, while in the same period this year 133,184 cars were loaded—an increase of 18,344 cars, or about 16%. For the week ending September 30, 39,830 cars of livestock were moved, representing an increase of 2,934 cars over the preceding week, and 6,851 cars, or 20%, over the same week last year.

Heaviest Merchandise Loadings

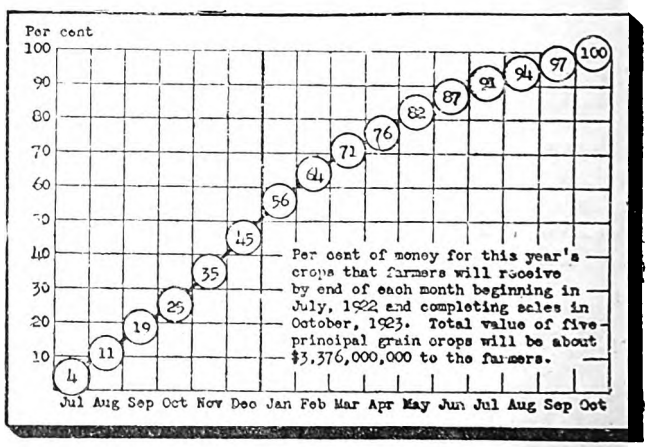
"IN the week ended September 30 the American Railway Association reports that 589,098 cars were loaded with merchandise and miscellaneous freight. *This is the greatest number in the history of the roads.* It was 36,735 in excess of the same week last year, and 39,061 cars more than the corresponding week in 1920, in which year the volume of all traffic handled by the railroads was the heaviest in their history.

"The loadings of all commodities, according to the latest figures available, are at the present time within 3% of the record loadings of 1920, while the loading of all commodities, except coal, for the week ended September 30 was 809,032 cars, which was the heaviest loading (excluding coal) of any week in the history of the railroads."

Farmers' Purchasing Power Indicated

The approximate amounts of money and the time they will be received

ABOUT $3,250,000,000 is the Department of Agriculture estimate of the total farmers will receive from July, 1922, to October, 1923, a 16 months' cycle beginning with harvesting in the Southwest in July of this year and ending when the most northern States begin to harvest the latest of next year's crops—corn, wheat, oats, barley and rye. In the chart the figures in



(Cleveland Trust Co.)

When farmers get their money.

circles show what proportion of the total farmers probably will receive by the end of each month. Half of the total is expected to be received (and mostly spent) by the end of 1922. The most rapid expenditure by farmers probably will be in November, December and January. As to what they are receiving and must pay, farmers are still worse off than in 1914 or 1915, but much better off than in 1921.

Mr. Ford Starts Something

The price war in the light car branch of the automobile industry is on again

AGAIN Henry Ford is making them talk. He has cut another $50 off the prices of his cars. His touring car now costs $298, F. O. B. factory, the runabout $269, and the sedan $595. During the war period the same cars sold at $575, $550 and $975.

In some quarters the new price cut is considered to be a symptom of a price war in the automotive industry. Two cars—the Star, made by W. C. Durant, and the Gray, made by a company headed by Frank L. Klingensmith, former treasurer of the Ford organization—are close to the Ford in price level, and they are expected to follow the new reduction. Both of these cars are newcomers, and are not widely distributed.

It is predicted that the cars slightly above the Ford level, such as Chevrolet, Dodge, Maxwell and Overland, will also cut prices. In Detroit, the bankers say, "Durant has his answer," and that prices will come down all along the line. Manufacturers of cars not in the Ford class say that price reductions will probably be confined to Ford, Willys-Overland, Chevrolet, Star and Gray.

C. S. Mott, vice-president of General Motors Corp., says:

"I presume the corporation will take cognizance of Ford's action in due time, but at present we have nothing up our sleeves. Chevrolet sales have mounted all during time Ford former prices were in effect and I see no reason for changing them now."

Colin Campbell, sales manager of Chevrolet, said:

"We made our reduction August 1 and brought out new models last week with about $80 additional value in them. We are doing a bigger business than we can handle."

C. D. Hastings, president of Hupp Motor Co., said:

"Ford is doing what has been expected. He is merely sticking by his policy of keeping a definite distance between himself and his competitors. It hardly seems possible that any makers of higher priced cars will follow with reductions, as many are on rock bottom now."

H. M. Jewett, president of Paige-Detroit, said:

"A touring car at $298 is about the last word in low prices. I do not believe Ford's action will disturb prices in any but the Ford class of cars and do not see how many of them can follow Ford's lead. With his parts business increasing every year, Ford is steadily nearing the time when he can sell the car at cost and still make all the money any man wants. Automobile prices are at the absolute minimum."

Price cutting during the past summer was confined chiefly to the medium-priced field, in which Studebaker, Buick, Nash, Oakland and Oldsmobile predominate. It is now said that these middle-class manufacturers are not likely to take immediate action, but that cuts in their field may follow next spring.

The following table, prepared by the *Wall Street Journal*, shows the extent to which prices of cheap touring cars have declined from the high levels of the past eight years:

	Present Price	Peak Price	Reduction	
Chevrolet	$525	$820	$295	36%
Dodge Brothers	880	1,285	405	31%
Ford	298	575	277	48%
Maxwell	885	1,155	270	23%
Overland	525	1,035	510	49%

"The Ford price cut becomes sensational," this paper adds, "when applied to the 1,250,000 cars which the company may sell this year as a result of the stimulus reasonably to be expected to follow the reduction.

"Based on current production, Ford profits are estimated at approximately $100 a car, after taxes. The $50 reduction means a loss in revenue to the Ford company of approximately $62,500,000 annually on the present production.

"This apparently would cut the Ford profits in half, but previous Ford reductions have never worked out in such a manner over any period of time.

"The company's policy, according to Henry Ford, has been to reduce the product to cost or below and to build up the profit structure anew on the basis of increased volume with its lowered costs per unit.

"Mr. Ford was never more optimistic about his business outlook and the belief is that with this reduction he intends to push production to a point not previously approached, possibly reaching 6,000 cars daily which would mean 1,800,000 for a 300-day year. This is beyond the present rated capacity of the Ford plant, but capacity with Ford has in the past meant simply a mark to exceed and almost every month has seen the output climb.

"One thing is certain, the present 5,300 cars a day does not mark the limit. The profit curve shoots upward almost in a straight line for cars turned out on top of such a production and with 6,000 daily as a possible goal in the not far distant future this Ford cut, like the others, may be absorbed.

"While the limitless capacity of the country for Ford cars is probably the key to the present drastic cut, the reduction already accomplished in costs must not be overlooked. Ford sales this year are certain to break all records, with the company owning more sources of raw material and operating more processes in manufacture than ever before in history."

The Ford Policy

THIS view of the matter is in line with the policy of the Ford concern and with the public statements of its officials. Commenting on the cut, Edsel B. Ford, president of the company, said:

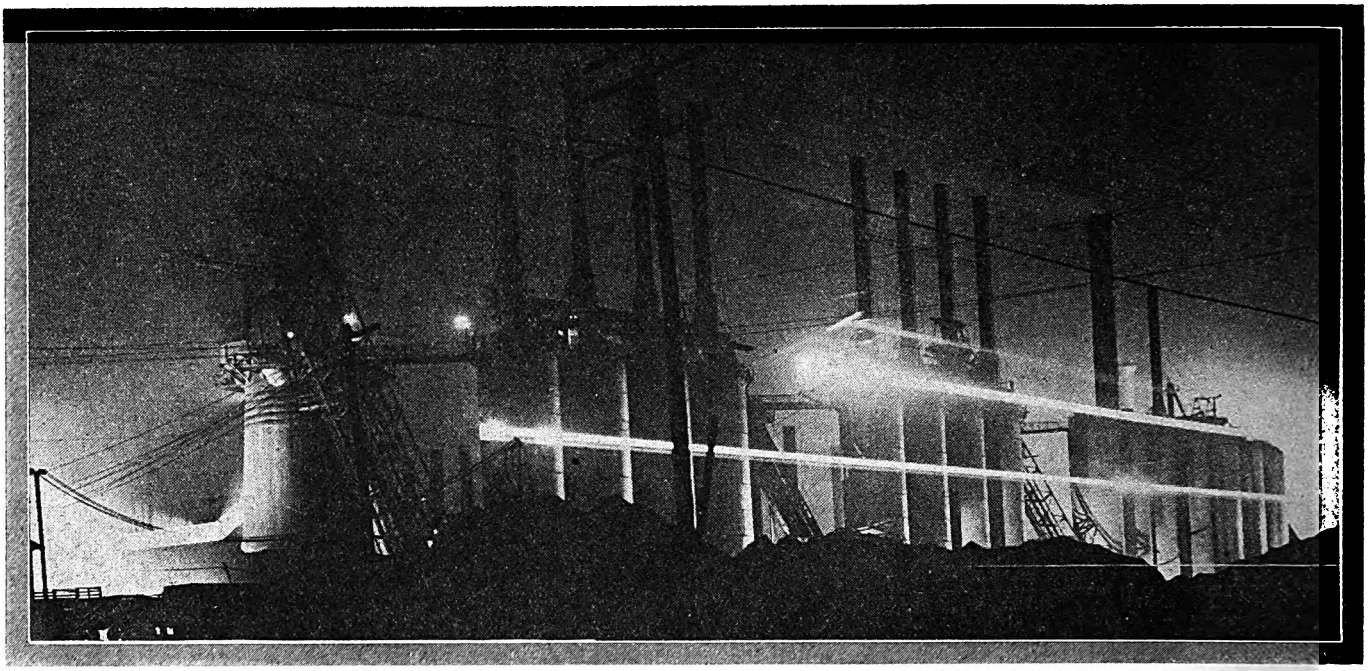
"Revision in prices is the result of increased volume of business which our company has enjoyed during present year. We own and operate many of our sources of raw material, which enables us to continue increasing the quality of our product and at the same time keep price so low that Ford cars are in reach of everybody.

"Our production for 1922 is already in excess of a million, which has been an important factor in bringing down costs. Our present daily output is averaging better than 5000 cars and trucks.

"It is in anticipation of this continued demand that price adjustments are again being made, in order to keep in effect the policy of selling Ford products at the lowest price consistent with quality."

Ford has repeatedly announced that he hopes in time to sell his car, tractor and truck together for a total of $1,000. He is now one step nearer to that goal. Those who ascribe the present reduction to competition should recall this long-standing policy, and should also remember that the Ford has as yet no real competition in its own line. It is hardly fair to say that the cut in Ford prices is due to the price war, although it may be true that this cut will induce other manufacturers to come down so as to remain as nearly as possible in line. Ford is not forced down, even though the other manufacturers may be.





Pittsburgh's steel mills at night afford one of the most striking sights in the world.

Jobs Plentiful: Living Costs Less: Business Men Optimistic

A condensed summary of a nation-wide survey on employment conditions indicates excellent prospects for winter retail sales

THE unemployment situation is remedied, according to reports from nearly every section of the United States, made by editors of representative newspapers to the Associated First National Pictures Corporation, which recently conducted a thorough business survey, and the results of which are published by the *St. Louis Globe-Democrat.*

More general than the statement of relieved labor conditions was the statement that bankers and business men are optimistic, that crops are good, that wages have not decreased as fast as the cost of living, and that the economic condition of the country is markedly "on the upturn."

From a study of the reports from the various States, it is noticeable that the strike problem in the East is holding back the employment of large numbers of men, but this is the only section where there seems to be an unemployment problem at all. Generally speaking, the Central States are in the most stable condition.

A synopsis of the various reports by states grouped into geographical divisions follows:

East

NEW YORK. The *Daily Financial America* says: Country is choked with gold. From present indications we will have bumper crops at fair prices. Unemployment is decreasing. Those out of work are strikers, who choose to be idle. However, the marine shipping lines are still depressed. The outlook generally is optimistic and soundly so.

PENNSYLVANIA. The *Pittsburgh Dispatch* says: Unemployment situation remedied. The outlook in all directions points to marked improvement. Rents are still too high, but generally there has been a reduction in living costs.

MARYLAND. The *Baltimore News* reports: Unemployment situation remedied. Cost of living much lower than during war time and appreciably lower than last year. Business men and bankers optimistic.

NEW HAMPSHIRE. The *Daily Patrol* of Concord writes: Unemployment situation not remedied to any appreciable extent because of the apparent ability of railroads to obtain men to take the place of strikers. Cost of living is lower. Average income per capita remains about normal.

NEW JERSEY. The *Trenton Times* has the following comment: Unemployment situation remedied to the extent of about 17%. Cost of living has reduced from peak, but is still 150% higher than in 1913. Slight trend upward at present. Business men and bankers optimistic, but do not look for big boom.

South

ALABAMA. The *Mobile Register* takes this view of the situation: Unemployment situation remedied due to money at an easier rate. Cost of living lower. Merchants generally express satisfaction with business done.

ARKANSAS. The *Arkansas Gazette* of Little Rock says: Unemployment remedied due to big crops, road work, building and oil business. State is prosperous. As a rule, business is better than before the war. Local bankers optimistic but advise caution, saying business conditions are not absolutely settled.

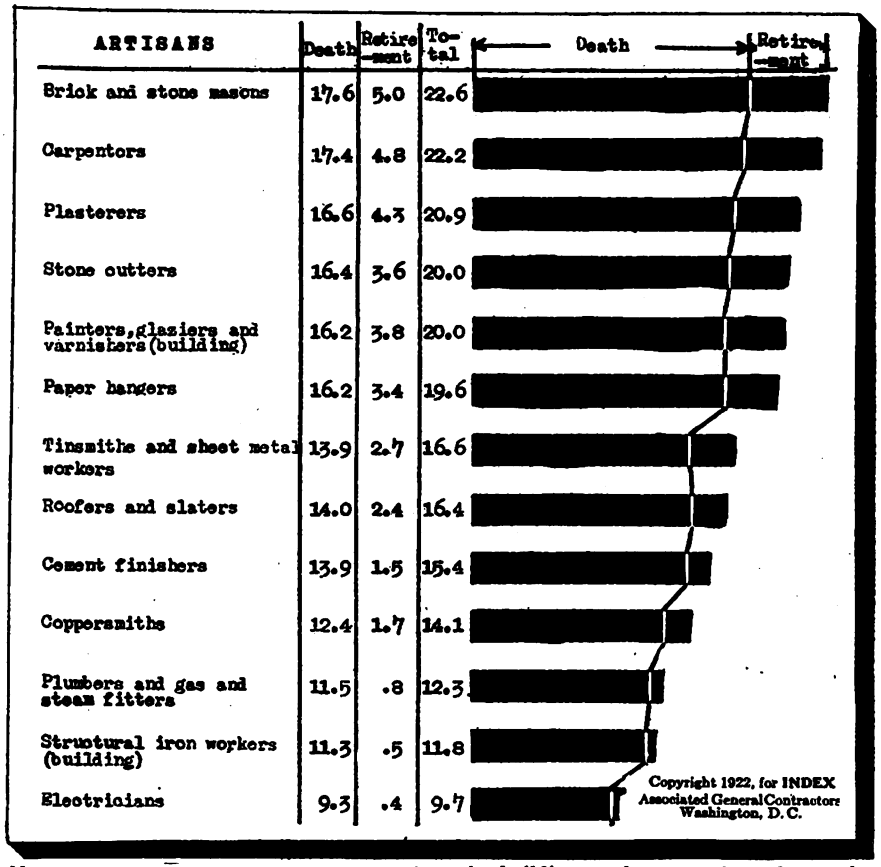
GEORGIA. The *Atlanta Constitution* makes this reply: Slight improvement in unemployment situation. Business outlook indicates decided improvement. Ten per cent increase in average income per capita. Business operations in Atlanta have reached a new high level.

LOUISIANA. The *New Orleans Item* responds in this wise:

Unemployment situation remedied, leaving railroad strike out of consideration. Labor beginning to get more regular work. Cost of living, if anything, slightly lower. Savings deposits in city and country begin to increase.

KENTUCKY. *The Inquirer* of Owensboro says: "Unemployment situation remedied. Plants have been running nearer capacity than since 1919. Cost of living lower.

MISSISSIPPI. The *Clarion Ledger* of Jackson sees the following: Improvement in unemployment situation. This section is largely agricultural and the outlook is unusually good. Cost of living is lower. Bankers and business men look forward to prosperous times.



New men needed annually per thousand in the building trades to replace those who die and retire.

NORTH CAROLINA. The *Charlotte Herald* says: Business situation will continue to improve because the farmer and the cotton mills are getting in better condition every day. Unemployment situation materially improved.

Central

OHIO. The *Cincinnati Enquirer* reports: There is no unemployment here except those affiliated with labor unions. In many lines there is a serious dearth of labor. There is a slight increase in the cost of living. General optimism prevails.

ILLINOIS. The *Chicago Journal of Commerce* believes that: Unemployment situation has improved to the extent that the steel industry and some other businesses are facing a serious problem in finding help. Packing houses have advanced wages for common labor to obtain help. Cost of living considerably lower than six months or a year ago. Business men and bankers conservatively optimistic.

INDIANA. The *Indianapolis Star* takes this view of the matter: Unemployment situation remedied. Business conditions in general have improved. Sales have been better. Cost of living is lower. Business men and bankers optimistic.

KANSAS. The *Topeka Daily Capital* comments: Unemployment situation remedied. Farmers again entering market for machinery after staying out two years. Nothing can prevent steady and increased trade revival. We are on the upcurve of the business cycle. General feeling among bankers and business men is one of hopefulness and increased confidence. There is no danger that business will not improve.

NEBRASKA. The *World-Herald* of Omaha declares: Unemployment situation remedied. Business outlook better on the whole if railroad strikes are satisfactorily settled. Cost of living lower. Business men and bankers mixed in views as to business conditions for the coming year. Everything lower except rents.

West

COLORADO. The *Rocky Mountain Times* observes: Unemployment situation remedied in West, due to better crop conditions and business in the cities. Cost of living about 25% lower. This section was not so heavily depressed as the East and is now on the upgrade.

IDAHO. The *Caldwell Daily News* says: Retail sales of staple commodities have increased. Bankers and business men optimistic. Money has become more stable and investors feel more secure. Unemployment situation remedied.

NEW MEXICO. The *Albuquerque Herald* reports: Unemployment situation slightly remedied. Increased building operation, better wool market and general improvement in the agricultural situation.

OREGON. The *Portland Telegram* makes this summary: Plenty of work in Oregon. Demand in logging camps and lumber mills hard to satisfy. Farmers unable to find enough help. Great drawback to complete recovery of our state is low price of agricultural products.

WYOMING. The *Cheyenne State Tribune-Leader* reports: Unemployment situation bad due to strikes. More unemployment expected in fall and winter because of unrest in labor world. Cost of living higher than six months ago.

CALIFORNIA. The *Los Angeles Examiner* has the following to say: This region is just getting a good start as Southwestern empire. All-year advertising in the East has brought a flood of new people and money. Note harbor growth and enlarged bank clearings. Retail sales of staple commodities have increased, due to growing population.

North

MICHIGAN. The *Detroit News* describes conditions as follows: Unemployment situation remedied. Strikes may hamper but will not deter improvement. Living costs decreased during period of depression but now show an upturn. The prospects here are for a considerable period of prosperity.

MINNESOTA. The *St. Paul Dispatch* says: Work for all who care to work for just wages in Minnesota. Want ad columns have right about faced. "Positions Wanted" have given way to "Help Wanted." Cost of living slightly lower. Retail sales of staple commodities have increased. Promise of steady prosperity in future.

NORTH DAKOTA. The *Fargo Forum* believes: Unemployment situation remedied. No men without jobs who want to work in this region. We expect a busy fall and winter because of bumper crops. Cost of living slightly higher than a year ago. Western North Dakota faces an exceptionally fine year.

No Bumper Crop After All?

THE October crop report shows that 1922 is not a year of bumper crops, notwithstanding the numerous published statements to the contrary. The composite condition of all crops for which condition is reported was 98.6% of the 10-year average condition on October 1, or at a time of harvest. That is, the prospect of production on October 1 was below average. These crops include cotton, notably a crop of low production this year. But even if this crop is omitted, the composite condition of all other reported crops was about 100.7% of the 10-year average condition.

A production of 2,853,000,000 bushels of corn is forecast by the U. S. Department of Agriculture for the date of October 1, in a report issued October 9. This prospective crop is 21,000,000 bushels below the forecast of September 1, making the forecast approximately an average crop, since the 5-year average for 1916-1920 is only about 22,000,000 bushels below the production indicated for this year.

For spring wheat an estimated production of 268,000,000 bushels is made, thus indicating a loss of 8,000,000 bushels since September 1. The spring and winter wheat crops now have a total estimate of 810,000,000 bushels, or 11,000,000 bushels more than the 5-year average.

Slight decreases in either forecasts or estimates of production are made for corn, spring wheat, oats and sugar beets.

The total production of important crops compared with last year is estimated as follows: Corn, 92.6% wheat, 101.9%; oats, 115.9%; rice, 107.4%; cotton, 126.2%; sorghum for sirup, 80.7%; sugar beets, 65.2% (last month, 67.6%); broom corn, 90.9%; beans, 142.9%; and grain sorghums, 83.3%.

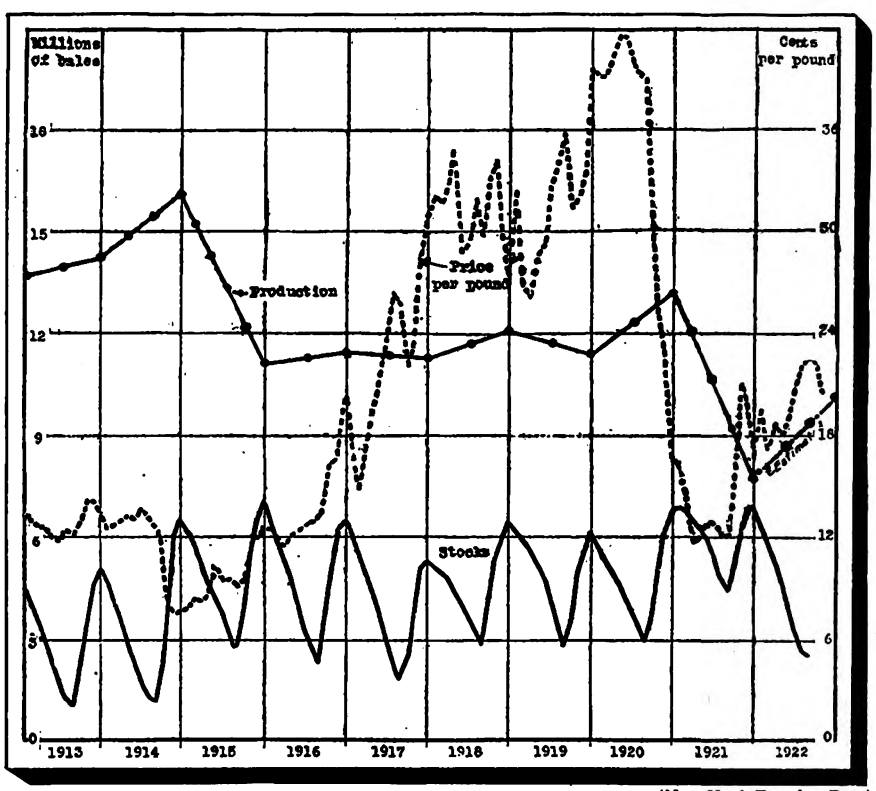


(Buffalo Commercial)

Hey, you're keeping the price down.

A Shortage of Raw Cotton Expected

EUROPEAN news has disturbed the cotton market. The latest Government forecast for the cotton crop of 1922, published on October 3, points to a probable yield of 10,135,000 bales. The Government's estimate in July was a crop of 11,065,000 bales, but subsequently unfavorable weather and ravages of the boll weevil have caused the Department of Agriculture to subject its earlier figures to a downward revision. The condition of the crop as of June 25 was reported at 71.2%, but this has since been lowered to 50%.



(New York Evening Post)

The trend of the cotton market during the past ten years.

Meanwhile, the small crop of 1921 and the increase in world consumption have resulted in a substantial reduction of stocks in warehouses and factories. The surplus is now at the lowest point since 1917, and if consumption continues at the present rate there is reason to believe that the carry-over at the end of the current crop year will have been reduced below the margin of safety and the consuming establishments may face a temporary cotton famine.

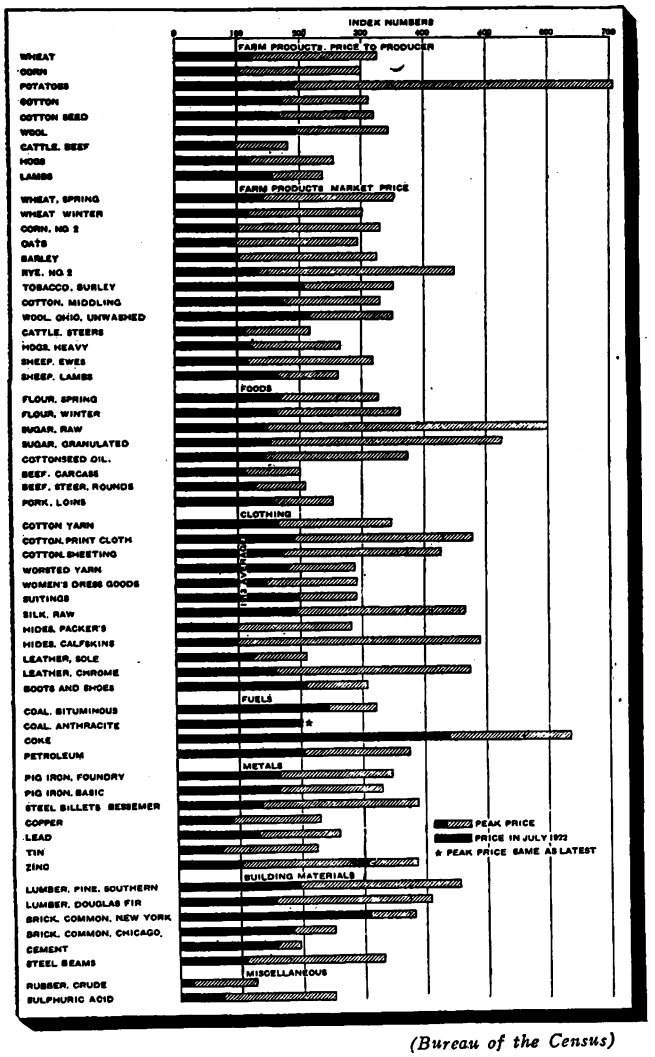
The chart shows very clearly that the sharp break in prices in 1920 was definitely related to the large yield of that year and that the subsequent rally was in response to the smaller crops of 1921 and 1922.

While the market during the current year has fluctuated considerably as a result of the uncertainties concerning the domestic supply and foreign demand, the net result of the changes has been a higher price level. The Near Eastern imbroglio, however, has had a disturbing effect on prices during the last few weeks.

Prices Will Stay Up

Harvard Economic Service predicts another decade of high prices

PRICES will not drop within the next ten years, in the opinion of the experts of the Harvard Economic Service. These economists refuse to accept the theory that an extended decline in the price level must always follow a war, and they do not believe that prices in this country will go back to the pre-war level. Conditions which caused big price drops after



(Bureau of the Census)

Comparison of present wholesale prices with peak and pre-war (relative prices 1913 = 100).

previous periods of inflation do not exist today, they think.

Prof. Charles J. Bullock, chairman of the Harvard Committee on Economic Research, explained this point of view at the annual conference of subscribers to the service. He explained as follows the reasons for the opinion:

"The gold situation must first be considered. Upon all the evidence we have concluded that monetary stocks of gold will continue to increase at the rate of approximately $150,000,000 per annum during the next eight years, and this means a larger annual increment than the world has ever had except during the few years prior to 1915.

"Before the war commodity prices were increasing at a very substantial rate, with an annual gold increment of $282,000,000, and there was a general complaint of the increasing cost of living. In view of this fact, it would seem that an annual increment of $150,000,000 should be ample to prevent a decline of gold prices during the present decade."

If the general trend of commodity prices should decline during this decade, he said, this result would be due to the financial policies pursued by the leading commercial countries and not to a shortage of the metal.

For most of the European belligerents, restoration of currencies to the pre-war standard would mean suffering too great to be endured, he said, and would probably end in total or partial national bankruptcy. Cancellation of all international war debts would obviously help the debtor countries to carry through policies of drastic deflation, he asserted, but would not necessarily mean that such policies would or could be adopted.

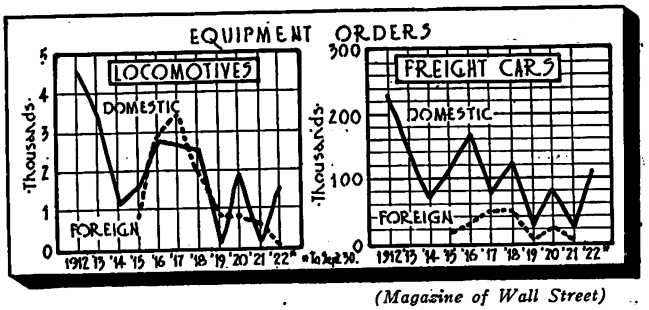
"Upon the other hand," he continued, "if these debts are to be paid, it must inevitably happen that prices of international commodities will be higher in creditor than in debtor nations, since otherwise payment cannot be made. Deflation in the creditor nations must therefore mean severe pressure upon debtor countries, while inflation leading to higher prices would obviously ease the strain of international payments.

"It is safe to observe that the United States, by virtue of the fact that it is the predominant creditor nation, is in a position to influence greatly the financial policies adopted in Europe. If we are prepared to accept, as apparently we must, the present price level as substantially that around which the fluctuations of the business cycle must play during the coming decade, we can contribute powerfully to financial stability throughout the world."

Equipment Orders Continue

Railroads are still buying heavily and manufacturers are kept busy

THE railroads are still buying equipment heavily. The Ford Motor Company is distributing orders for 1000 coal cars, according to reports, and the Baltimore & Ohio railroad has ordered another thousand hopper cars from the American Car and Foundry Company. The Rock Island, the Pere Marquette, the Virginia Railway and the Chesapeake & Ohio are all heavy purchasers. The curve on the chart below, particularly with regard to freight cars, shows a continuance of the upward trend during the month of October. The activity in equipment companies has been largely discounted in the financial district, but equipment orders are still very active.



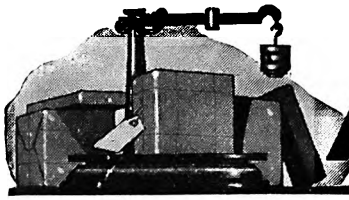
(Magazine of Wall Street)

Equipment orders for foreign and domestic locomotives and freight cars, 1912, to September 30, 1922.

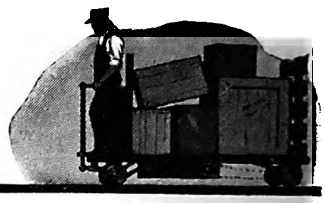
Structural steel is also in great demand and the only factor which is negative for the steel industry is the shortage of labor.

Sky-High Advertising in Paris

AN American firm in Paris started on October 9 to advertise in the sky. Aeroplanes equipped with smoke-ejecting apparatus and doing nose dives, barrel rolls, and side spins wrote advertisements against the Paris sky for staring boulevardiers. This new system of copywriting will be considerably limited since aeroplanes are forbidden to fly low over Paris. Newspaper publishers are also cautious about giving publicity to such stunts and thus part of the value is lost. Then, too, the sky may prove a difficult medium in which to make regular insertions.



AT A GLANCE



Building and Construction

REPORTS from 193 cities to the *American Contractor* for the month of September indicate slight recession from August activity. The number of permits issued was 57,525 and $205,780,795 is the total valuation. This represents a 34% lead over the valuation of $152,867,082 and 50,733 permits issued one year ago.

Cement

PORTLAND CEMENT production figures for September, 1922, were 11,424,000 barrels compared with 11,664,000 barrels the month before and 10,027,000 barrels in September, 1921. Shipments were 12,444,000 barrels in September, 1922, compared with 14,361,000 barrels the month before, and 11,329,000 barrels in September, 1921. Stocks, e.o.m., were 4,726,000 barrels in September, 1922, as compared with 5,746,000 barrels the month before and 6,953,000 in September, 1921.

Rubber

GOOD increases were made in production and shipments of all kinds of tires in August and in the consumption of crude rubber. Stocks of tires declined, except for solid tires.

Distribution

SALES of chain stores increased slightly in August and were considerably higher than a year ago. Magazine advertising increased, as did postal receipts, but newspaper advertising declined slightly.

Metals

COPPER production rose above 100,000,000 pounds in August for the first time since 1920, and was almost five times as high as a year ago.

Zinc

STOCKS on hand for all companies, September 1, 1922, were 21,629 tons; and 33,134 tons were produced during the month. Stocks on hand, September 30, were 18,806 tons; and 35,957 tons were shipped during the month; 312 tons were reported sold for export during the month.

Iron and Steel

THE Department of Commerce announces a slight decline in the sales of fabricated structural steel in September. Sales amounted to 61.9% of shop capacity, compared with 64.9% in August. Reports received from 137 identical firms, with a shop capacity of 218,155 tons per month, show 135,069 tons booked in September as compared with 141,561 tons in August. The following cover sheet steel for September, 1922:

	Net Tons	Per cent to capacity
Total sales for month.....	188,863	75.0
Total production	202,600	80.4
Total shipments	190,027	75.4
Unfilled tonnage, Oct. 1.....	378,574	150.3
Finished stock on hand.....	102,198	40.5
In stock, unsold.....	21,241	8.4

The total number of hot mills in the United States is 641, having a capacity for September, 1922, of approximately 365,000 tons, and the percentage of the capacity to which the figures shown above are related is about 67%.

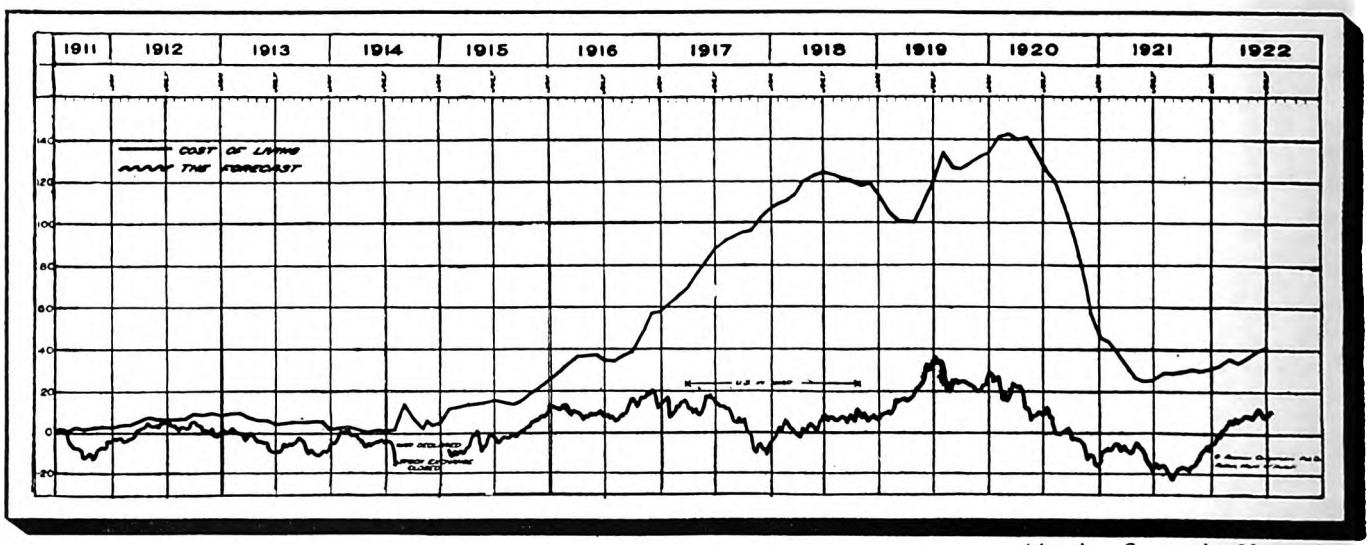
Fuel

THE production of bituminous coal for the week ended October 14 of this year was 10,021,000 net tons compared with 9,736,000 tons the preceding week and 9,711,000 tons a year ago. The production of anthracite for the week ended October 14 was 2,075,000 net tons, compared with 1,959,000 tons the preceding week and 1,813,000 tons a year ago.

Paper and Publishing

NEWSPRINT activity is indicated by reports from 83 mills in August (compared with 92 mills a year ago) which produced 133,236 net tons (102,277 tons a year ago) and stocks of 19,902 tons e.o.m. (27,128 tons a year ago) Fewer mills in 1922 reported greater production and smaller stocks.

Monthly tonnage reports from 693 of the most important newspaper publishing concerns and associations show these results for August, 1922: Net tons on hand the first of the month were 171,410; net tons received during the month, 179,868; net tons used and sold during the month, 157,655; net tons on hand, e.o.m., 183,623; and net tons in transit, e.o.m., 40,944.



(American Co-operative Manager)

Buyers' barometer, 1911-1922. The forecast curve, which has continued to rise during July and August, points to a continued rise in wholesale prices throughout the fall.



Basic Commodity Prices

(Minimum, at New York, unless otherwise specified)

	Week Ending Oct.21	Week Ending Oct. 14	Year Ago
Aluminum, pig (ton lots), lb.	.175	.175	.17
Antimony, ordinary, lb.	.06	.06	.0525
Brick, Hudson R., per M.	17.00	18.00	15.00
Cement, Portland, bbl.	1.70	1.70	1.70
Copper, Electrolytic, lb.	.13875	.14	.13
Cotton, spot, Mid. Upl., lb.	.2345	.2225	...
Hides, Chic. Pack., No. 1, lb.	.225	.225	.15
Lead, N. Y., lb.	.0675	.066	.047
Petroleum, crude, at well, bbl.	3.00	3.00	3.25
Pig iron, Bessemer, Pgh., ton	35.27	35.27	21.96
Pine, roofers 6 in., M. ft.	34.50	34.50	31.00
Rubber, Up River, fine, lb.	.23	.1925	.225
Silks, Sinshiu, No. 1, lb.	8.25	8.20	6.10
Spelter, N. Y., lb.	.072	.0695	.05
Steel Billets, Bess., Pgh., ton	40.00	40.00	29.00
Tin, N. Y., lb.	.34875	.3375	.285
Wool, Dom., ½ blood com., lb.	.51	.51	.29

Wholesale Commodity Prices

Coal—			
Bit., ¾ in., lump, net ton	5.25	5.25	...
Anthracite, egg, net ton	7.75	7.75	...
Coke, furnace, net ton	10.00	11.00	3.35
Cotton Goods—			
Brown Sheetings, Std. yd.	.14	.1375	.135
Standard Prints, yd.	.105	.105	.11
Print Cloths, 38½ in., 64x60, yd.	.09375	.0925	.09
Drugs and Chemicals—			
Alcohol, ethyl, form 5, gal.	.36	.36	.41
Alcohol, wood, 95%, gal.	.79	.79	.65
Alum, lump, lb.	.035	.035	.035
Bleaching Powder, over 34%, 100 lbs.	2.00	2.00	2.25
Borax, crystal, in bbl., lb.	.06	.06	.055
Caustic Soda, 76%, 100 lbs.	3.45	3.45	4.00
Lime, factory, 200-lb. bbl.	1.90	1.90	1.90
Nitric Acid, 42°, lb.	.055	.055	.0675
Saltpeter, crystal, 100 lbs.	.0775	.07625	.08625
Soda Ash, 58% light, 100 lbs.	1.75	1.75	2.15
Sulphuric Acid, 60%, 100 lbs.	.50	.50	.55
Flour—			
Spring Pat., 196 lbs.	6.65	6.50	7.00
Winter, soft str't, 100 lbs.	5.40	5.15	5.85
Grains—			
Wheat, No. 2 Red, bu.	1.385	1.3225	1.12
Corn, No. 2 Yellow, bu.	.9275	.8675	.6475
Oats, No. 3 White, bu.	.565	.55	.415
Rye, No. 2, bu.	.965	.925	.88
Barley, malting, bu.	.82	.79	.61
Hay, No. 1, 100 lbs.	1.25	1.25	1.40
Straw, lg., rye, No. 2, 100 lbs.	1.15	1.15	.95
Hides—			
Cows, heavy native, lb.	.21	.205	.135
Country, No. 1 steers, lb.	1.45	.145	.09
Iron and Steel—			
Basic, Valley furnace, ton	30.00	31.00	19.25
Steel bars, Pittsburgh, 100 lbs.	2.00	2.00	1.60
Beams, Pittsburgh, 100 lbs.	2.00	2.00	1.60
Galvanized Sheets, No. 28, Pittsburgh, 100 lbs.	4.50	4.50	4.00
Leather—			
Union backs tr., lb.	.50	.45	.42
Scoured oak backs, No. 1, lb.	.55	.55	.54
Lumber—			
FAS Qtd. Wh. Oak, 4/4", M. ft.	145.00	145.00	135.00
Tonawanda Wh. Pine No. 1 barn 1x4", M. ft.	82.00	82.00	86.00
Adirondack Spruce, 2x4", M. ft.	38.00	38.00	44.00
No. 1 Com. Y. Pine Bds., 1x4", M. ft.	47.25	47.25	39.00
Oils—			
Coconut, spot N. Y., lb.	.085	.085	.105
Crude, tks. f.o.b., coast, lb.	.0675	.11375	.08
China Wood, bbls., spot, lb.	.1275	.1275	.15125
Cottonseed, lb.	.093	.091	.086
Linseed, city, raw, gal.	.93	.95	.73
Paraffine wax, ref., 125 m. p., lb.	.0325	.0325	.03625
Turpentine, gal.	1.68	1.42	.74
Paints—			
White Lead, in oil, lb.	.105	.105	.1225
White Lead, dry, lb.	.0775	.0775	.065
Zinc., Amer., lb.	.07	.07	.075
Paper			
News roll, 100 lbs.	4.00	4.00	4.25
Book SS. & C., lb.	.07	.07	.067
Wood Pulp ton	...	...	80.00
Sugar—			
Cent. 96°, 100 lbs.	5.53	5.40	4.00
Fine Gran., in bbls., 100 lbs.	6.80	6.75	5.20
Wool—			
Boston Aver. 98 quot., lb.	.7313	.7313	.4040
Stand. Clay Wor., 16-oz., yd.	3.25	3.25	2.85
Fancy Cassimere, 13-oz., yd.	2.45	2.45	2.25
Serge, 36", Wor., yd.	.65	.65	.50
Broadcloth, 54", yd.	2.875	2.875	2.50
Cottonwarp serge, 36", yd.	.475	.475	.45

Financial

Bank Clearings	Week Ending Oct. 21	Week Ending Oct. 14	Year Ago
New York	$5,282,875,932	$3,950,707,762*	$3,833,546,944
Chicago	692,763,585	542,162,540	537,758,810
Entire Country	9,732,000,000	7,383,000,000*	7,270,000,000
Increase or decr.	+33.8%	+12.2%	—20.3%

*Five-day week.

(Per cent of total from preceding year)

Cost of Money—New York	Week End. Oct. 21	Week End. Oct. 14	Year to Date	Year Ago
Call Loans	6@4½	6@4½	6@2¾	5½@4
Time Loans (60-90 days)	5@4¾	4¾	5@3½	5½@4¼
Six Months	5	5@4¾	5@3¾	5¾@5¼
Com.Discounts,4-6mo.	4¾@4½	4¾@4½	5@4	6@5¾

Financial Transactions	Week Ending Oct. 21	Week Ending Oct. 14	Year Ago
Stock Sales, shares	6,416,793	5,623,341	2,814,270
Aver. Price, 25 Railroads	69.99 h. 68.47 l.	69.37 h. 68.06 l.	52.79 h. 51.23 l.
Aver. Price, 25 Industrials	116.24 h. 111.71 l.	113.24 h. 109.41 l.	79.97 h. 72.69 l.
Sales of Bonds, Par Value	$107,013,600	$76,258,250	$74,144,000
Aver. Price, 40 Bonds	81.01 h. 80.50 l.	81.71 h. 81.09 l.	79.99 h. 70.69 l.
Average Net Yield, 10 High-Grade Bonds	4.595%	4.545%	5.210%
New Security Issues	$65,450,000	$6,124,000	$19,400,000

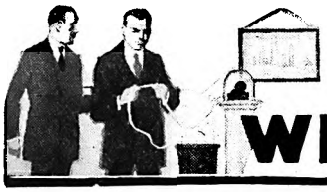
Business Failures	Week End. Oct. 19	Week End. Oct. 12	Year Ago
Number	442	390	407
	Sept., 1922	August, 1922	Sept., 1921
Liabilities	$36,500,000	$40,279,718	$37,020,837
Number	1,560	1,714	1,466

Industrial

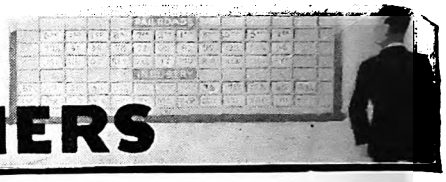
Building Permits. (153 cities)	Sept. 1922 $193,121,650	Aug., 1922 $212,909,181	Sept., 1921 $147,800,846
Idle Freight Cars	Sept. 15, 1922	Sept. 8, 1922	Aug. 8, 1922
Number	168,683	188,882	321,897
Car Loadings	Oct. 7, 1922	Sept. 30, 1922	Sept. 2, 1922
Number	968,169	998,381	931,598
Railroad Earnings	Week ending Oct. 14	Week ending Oct. 7	Year Ago
Gross (13 railroads)	$16,543,468	$16,190,387	$15,361,125
Steel and Iron Barometer	Sept. 30, 1922	Aug. 31, 1922	Sept. 30, 1921
U. S. Steel Orders (tons)	6,691,607	5,950,105	4,560,670
Daily Pig Iron Prod. (tons)	67,791	58,586	32,850
Monthly Pig Iron Prod. (tons)	2,033,720*	1,816,170†	985,529*

*Month of September. †Month of August.

Foreign Trade	September, 1922	August, 1922	September, 1921
Exports	$317,000,000	$302,000,000	$324,863,123
Imports	232,000,000	271,000,000	179,292,165



WITH THE FINANCIERS



Money Prospect Changing

HAS the financial situation taken a new turn? Money has been comparatively tight for an extended period, and according to the seers, a change in money rates is the first sign of a change in the trend of security prices and of credit in general. The *Magazine of Wall Street* suspects that a new turn has arrived:

"Money and credit developments since the beginning of October have indicated the arrival of a new turn in the financial situation. There has been a decided hardening of rates notwithstanding that the lending power of the community is far greater than any probable draft that is likely to be made upon it. On the other hand, there is nothing in sight to cause the slightest fear of what is ordinarily termed stringency or any considerable disturbance to business conditions. But the situation has developed in a way which indicates the importance of unusual caution on the part of securities holders and prospective buyers.

"The fact remains that the general movement of corporation credit, as indicated by the average yield of 10 high-grade railway bonds, is slightly changed, the figure standing at 4.53%—a trifling upward movement from the level noted last month. The value of the older outstanding corporation securities is still slightly declining, or, in other words, the cost of credit to the corporate borrower is very slightly increasing. This situation is accentuated by the fact that commercial paper is now again tending slightly upward, while time money has also moved to a higher level and seems disposed to remain there. Call funds have likewise shown a drift toward higher figures which, although interrupted from time to time, nevertheless continues. There seems no reason to doubt that the money prospect is changing.

"There has been an inclination to speak of this change in rates as a 'seasonal' matter, and there is some reason for so regarding it. We are now approaching the time when demands for crop-moving money are at their peak and when therefore funds are naturally withdrawn from the investment market for the purpose of financing the movement of products. Nevertheless, all the indications are to the effect that the volume of such demand this year is less than for a good while past. The fact that the increase of applications for rediscount at Federal Reserve banks has been only about $100,000,000 since the low point reached by bill holdings, shows that banks are amply able to finance their customers in most cases.

"There has been an unusually small need for funds for use in crop moving. This makes it seem that the factors which are at work upon money rates are of more far-reaching character than those of a merely seasonal nature, or in other words that the time is coming when the investment market must reconcile itself to costlier funds and a smaller volume of them. Shortly before the end of September the volume of brokers' loans had reached a point admittedly above that of the autumn of 1920, which in itself was the highest previously arrived at. Since then, there have been from time to time recessions caused by the calling in of funds which have reduced these loans to some extent. This tendency may be expected to go further."

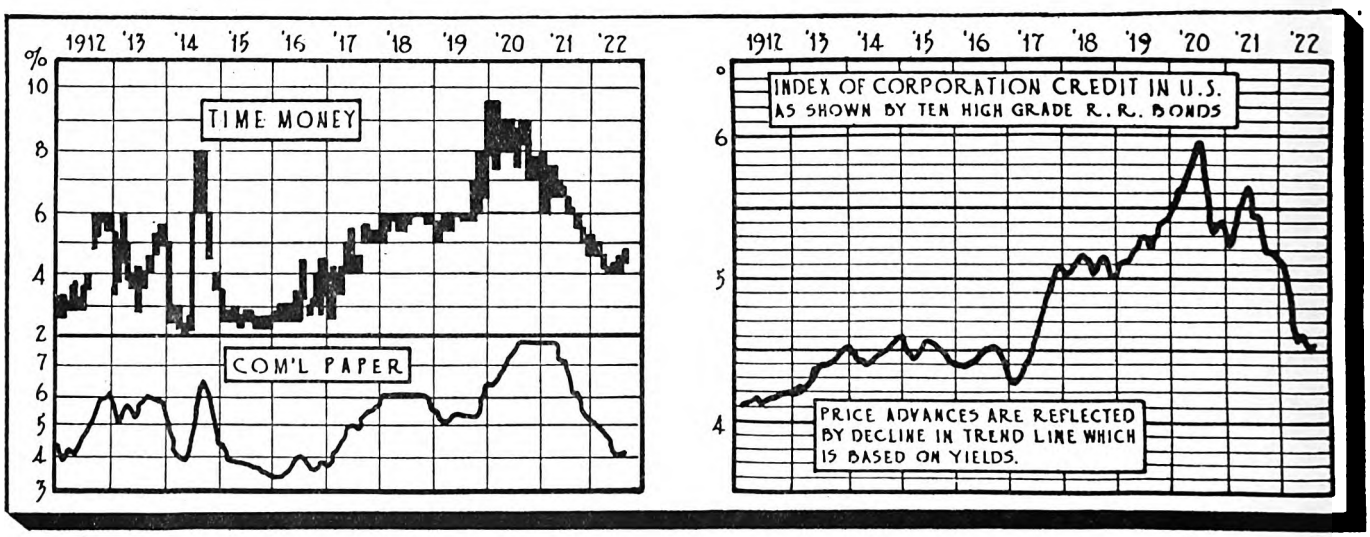
The Federal Bond Issue

THE issuance of $500,000,000 of new 4¼% United States bonds to mature in 30 years indicates that Secretary Mellon of the Treasury does not expect interest rates to decline further. It has been the Treasury policy during the period of declining interest rates to finance itself by means of short-term notes. Mr. Mellon has decided that the money market has reached a stage where a long-term issue is advisable.

The success of the Government bond issue—although it was really a foregone conclusion—was hailed as a favorable indication. According to the *New York Tribune*, it "emphasized the fundamental abundance of credit, in spite of the falling reserve ratios, the increased borrowings at the Reserve Banks and 6% call money, which are expressions of seasonal trade and agricultural demands primarily." The *New York Times* says:

"The instant success of the loan throws two facts into striking relief. One is the excellent credit which the Government enjoys. It can go into the market and get its bonds taken at a rate far below that which any other country has to pay. This is a tribute not only to the resources of the United States, but to the skill and soundness with which its public finances have been managed. The other thing made evident by the way in which the loan has gone is the indispensable function of the banks. Doubtless they were sounded out in advance by Secretary Mellon, so that he was sure that the loan would be taken before he announced it. In the imme-

(Turn to page 1793)



(Magazine of Wall Street)

The chart at the left shows the fluctuations of the interest rate on time loans and commercial paper. The index of corporation credit, on the right, is based on the varying yields of high-grade bonds.



Rail Workers Get $22,000,000 Increase

THE Railway Labor Board has quietly recognized the changed trend in wages by granting a $22,000,000 increase to 451,911 maintenance of way and shop workers. This action is especially interesting because it was taken before the disturbance caused by the Board's action in the opposite direction has had time to pass over. The strike of shopmen that followed the pay cuts of last spring is still lingering on some railroads; yet the Board is already starting to grant pay increases.

Two cents an hour additional pay is granted to the workers affected. The increase means an addition of $22,125,000 to the wage bill of the nation's railroads.

The decision came after ten days of deadlock among the Board members, during which Chairman Hooper and a member of the public group succeeded in persuading a majority to favor the increase. The rise was proposed by the public group, but it could not be declared until W. H. McMenimen of the labor group and Samuel Higgins of the railroad representation were persuaded to support it.

Labor Board Still in the Saddle

IT remains to be seen whether this decision will increase the prestige of the Labor Board, whose influence lately has seemed to be declining. When the decision was made public it was also announced that 16 railroads had completed agreements with new organizations of their shopmen, by which the men, in effect, waive the right to strike and the companies agree not to take legal action against the unions, both parties pledging themselves to abide by the decisions of the labor board. The mileage represented by the 16 roads, which include such systems as the New York, New Haven and Hartford, Lehigh Valley, Central of Georgia, Chicago, Burlington and Quincy, Southern Pacific and Union Pacific, aggregates 55,916.

It would appear from this that the influence of the Board is far from disappearing. But the officials of the unions, both the railroad brotherhoods and the American Federation of Labor, have been loud in their attacks on the Board. The brotherhood leaders recently denounced all Government interference as the work of meddling politicians, declaring that the roads and the unions are perfectly capable of settling things among themselves in the old-fashioned way. The railway executives, it is well known, are not fond of the Board. And Samuel Gompers said at a luncheon the other day:

"Whenever a Government has attempted to interfere politically with the economic life of a nation it has always resulted in meddling and muddling. The Railroad Labor Board was created by a law passed against the wish of organized labor and against the wish of many of the executives of the railroads. Its decisions have been satisfactory to neither side.

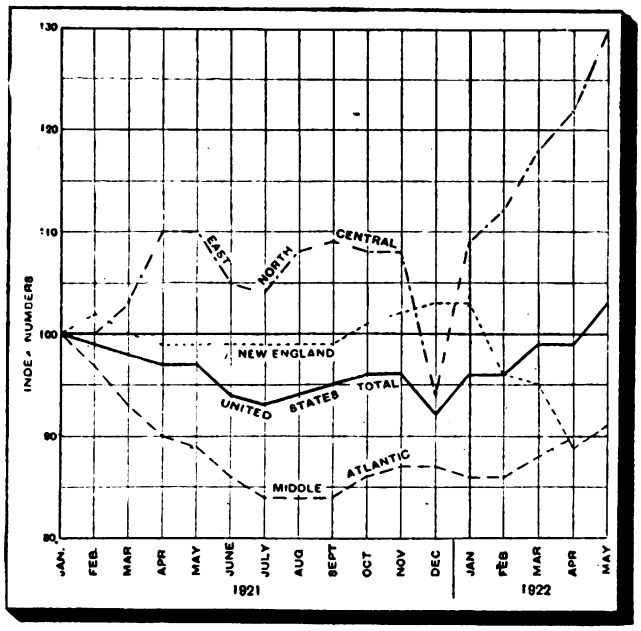
"Instead of the old method of negotiation between representatives of the men and representatives of the railroads we have a situation where each side presents its maximum claims. They are litigants, willing to concede nothing to each other, and opponents before a tribunal."

Labor and Soldiers Fraternizing

A SHREWD bit of diplomacy was consummated by Mr. Gompers when he arranged a program of closer relations with the American Legion. Individuals and groups of the veterans, sometimes appearing to act as part of the Legion, have from time to time been extremely unfriendly to organized labor. They have even acted as strikebreakers. Mr. Gompers evidently decided to end all this, and quietly went about arranging a plan to take the Legion under his wing.

"The arrangement is," Mr. Gompers told a convention of the Legion, "that after the close of this conference a joint body shall be established between the Legion posts and the federation of trades and local trades central bodies in each community. That is the character of work. Begin at the bottom in your locality where your men and women know each other, and so long as you maintain that friendly fraternal relation, working for the common good, nothing can happen to widen a breach between the American Legion and the American Federation of Labor."

Mr. Gompers said that already relations had been established between three Legion posts in Atlanta, Ga., and the federated union organizations in that city.



(U. S. Bureau of the Census)

Relative trend of employment, by districts.

More Coal Trouble in Prospect

THREATS of trouble in 1923 come from the coal fields. C. E. Maurer told the American Mining Congress in Cleveland that there will be another strike the first of next April over the same wage question that closed the mines last summer. Mr. Maurer calls on the industry "to organize its household for self-examination, self-expression and self-government." He thinks the United Mine Workers have run away with the coal-mining business, and that the operators are incompetent to handle their own affairs. The *New York World* says:

"Mr. Maurer is entirely correct about the condition of the industry, but his suggestion comes a bit late. The operators have had their chance to put their service on a business basis and they have not done so. What they have not even begun to do in the whole history of the industry they could hardly accomplish by the end of March. That is why there is a

(Turn to page 1793)



IN THE MANAGER'S OFFICE



Science of Good Management

D. B. GOUCHET, whose remarks before the Society of Industrial Engineers are reprinted in *Factory,* makes the following pertinent suggestions on the science of good management: Be a human engineer—above all else understand men and women; never forget their limitations. When making any plans or decisions, you must have the ability to assign the right man to the job.

Adopt the very simplest system that will get the essential result. Make certain that the system can be operated by men and women of average ability. Do not allow the system to be the master, but always use it as a good servant.

Definitely define and allocate responsibility and authority. Tolerate no possibilities of doubt in this matter.

Use the brains of the entire organization. Decentralize control to the extent that each man from the clerk to the president can truly run his job. Beware of broad theories of centralization or decentralization. If you give employees the chance, you will find they have more brains than you may have given them credit for.

See that one department (call it planning or production, or what you will) has full authority or control of the time and quantity elements; that is, schedules and promises.

Make the sales department responsible for required production; no other department can anticipate requirements as well.

Never get behind on repair parts orders. Do not allow excessive overhead or waste, both of which enter into costs. Watch labor turnover every week.

Insist on simple, definite statistics. Do not bury reports in the files of the chief executives; let every department head have all statistics on matters he controls. Statistics are your check on department heads.

Always stimulate and encourage all heads of departments for new methods, improved tools, changes in design to facilitate production, inventions and so forth, to reduce cost and increase production.

Let your costs, primarily, be practical and show the actual cost elements—not merely theoretical with a view to balance accounts. Use budgets for all expenditures. Adopt a system of wages that offers an incentive to all employees.

Reducing Variety of Products

MANY of our industries believe that we are suffering from too great variety in almost every article of commerce in this country, according to William A. Durgin of the Division of Simplified Practice, Department of Commerce. Leading men in widely different fields agree that the reduction of variety, the simplifying of industrial and commercial practice in any line, will secure some or all of the following advantages: Simplification will decrease (1) stocks, (2) production costs, (3) selling expenses, (4) misunderstandings, (5) all costs to user. Simplification will increase (1) turnover of stock, (2) stability of employment, (3) promptness of delivery, (4) foreign commerce, (5) quality of product, (6) profit to producer, distributor and user.

Why Managers Ignore Personnel

THREE reasons which are largely responsible for managers' indifference to personnel problems are given by S. A. Lewisohn in *Personnel Administration:* (1) Intellectual interest in the routine of administration problems. The professional training of most managers has been such that they prefer the mechanical methods of administration to the psychological problems. The task of securing harmonious relations in the shop or office is a mixture of politics and salesmanship which is distasteful to many executives. (2) The class consciousness of the employer. A great deal has been written of the class consciousness of the working class, but it is not sufficiently realized that managing executives are frequently just as class conscious—an attitude inspired by fear, ignorance and distrust. Without these officials realizing it themselves this feeling increases their unwillingness to devote thought and attention to personnel problems. (3) The belief on the part of some executives that there are larger profits in devoting their attention to financial, selling, engineering and mechanical problems.

"Axioms of Industrial Effectiveness"

UNDER the caption, "Axioms of Industrial Effectiveness," C. E. Knoeppel, in *Administration,* recommends the following for study and guidance: (1) Consideration of all factors in costing and pricing is the only protection against unintelligent competition. (2) The best insurance against loss in producing and marketing goods is to work to predetermined standards. (3) That concern is best protected against the uncertainties of commercial competition which is most closely in touch with its current facts and happenings. (4) No division of a business should be served at the expense or to the exclusion of other important divisions. (5) Averages should be used with caution and with the fullest realization that some items are above and some below. (6) Productivity in the last analysis is the real guage of economy in manufacture. (7) That concern which is best posted as to idleness, inefficiency and rejection is in the best position to eliminate these industrial wastes. (8) Profit on goods should not be based on total costs, but only on labor and overhead costs.

Cutting Overhead

THREE ways in which overhead costs were reduced and an increased profit realized are described by F. C. Rand in *Factory.* The case in point is shoe manufacturing, but a great deal of the experiences stated may be applied in the reduction of costs in other industries.

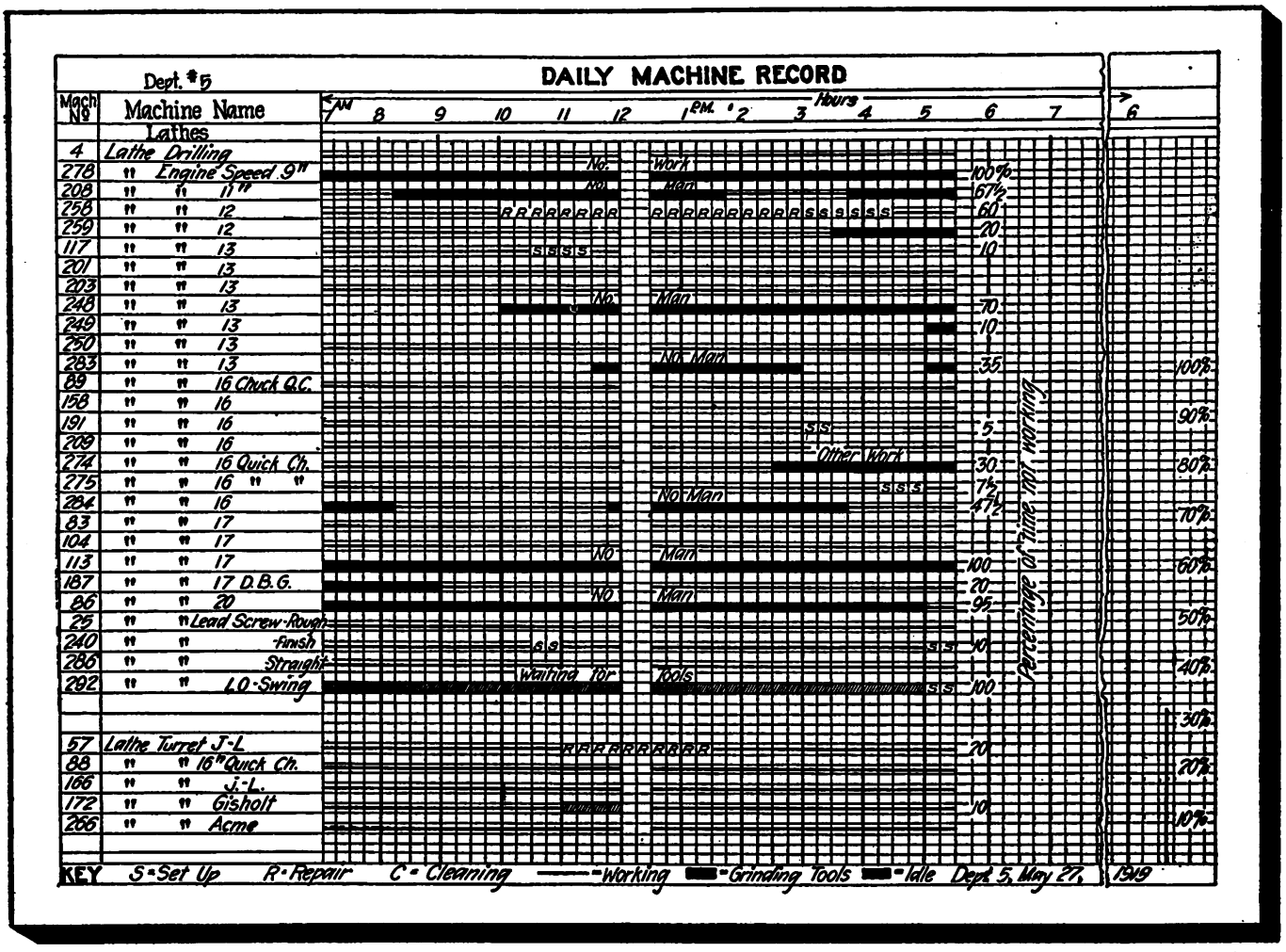
The first step was the simplification of the product and the standardization of designs, resulting in steadiness of operation, simpler clerical work, less supervision, quicker manufacture (turnover) and reduced sales expense.

By eliminating substitute materials and adopting uniform qualities lengthy and frequent discussions of how much substitute to use were done away with, less factory supervision was required to see that the proper amount of substitute was used, sales good-will was created, sales expense reduced and a steady market assured.

Deliveries were regulated according to factory production schedules and not according to seasons. This prevented choking the factory with finished goods held for delivery on a certain date and did away with cancellations of orders on a falling market. In addition, all the economies of quantity production were realized and sufficient time is provided for adequate planning of production.

Dollars in Scrap Heaps

THE average plant throws away thousands of dollars in the form of discarded material which could be converted to use. R. A. Hunter, writing for *The Purchasing Agent,* offers some practical suggestions for the salvaging of waste materials.



(Industrial Management)

Controlling production by charting it. This chart shows at a glance the condition of operation or idleness of every machine in the plant. See text below for a description of the use of the chart.

It is not possible for many firms to maintain a special salvaging or reclaiming department. There are few firms, however, which cannot afford to employ one man to supervise the collection, preparation and disposal of waste material. The man selected for this work should have general mechanical knowledge and ability and should work under the direct supervision and authority of the plant storekeeper. Through the stores department the work should be subject to the general supervision of the purchasing agent.

To successfully reclaim and dispose of waste materials, it is essential that proper equipment for the handling of waste be provided. The exact type and class of equipment necessarily depends on the size, production and character of the plant. In most plants a paper baler can be used advantageously. In practically all machine shops a magnetic separator is needed to gather steel or iron chips from non-ferrous trimmings. The market value of brass, bronze or aluminum turnings that are free from steel chips is very much higher than that of mixed scrap. The separation of grades in bins provided for that purpose will add to the market value likewise.

The proper man in charge of waste material will be able to salvage quantities of steel bars, high-speed steel ends, wrought iron, brass and copper sheets and other forms for standard materials. Much of the material thus reclaimed will be unfit for use in its present state, but can be made usable for many purposes at slight expense. Tons of bolts that are discarded because of damaged threads may be restored by the use of a bolt-shearing and threading machine. The same machine may be used to make perfect nipples from material which has been discarded as junk. Leather belting, lumber, cotton waste, valves and tools are other items which may be reclaimed most profitably.

In the reclamation of waste materials, it is quite possible to go to extremes. Two factors which should be considered are (1) the quantity and grades of materials used at the plant where the reclaiming is done and (2) the cost of reclamation. Under the cost should be considered handling, interest, depreciation and probable life of the reclaimed material.

Control of Machine Performance

AN excellent method of controlling machine performance is illustrated on this page and described by G. T. Hamilton in *Industrial Management*. All machines are listed, and from the daily time cards the descriptive lines are drawn. When the machine is running, a light line is shown. If it is being set up, the number of hours taken is shown by the symbol "S"; if tied up for repairs, the symbol "R" is used; and for cleaning "C." The heavy shaded line means waiting for tools, and the heavy black line shows idleness of all other kinds, such as no man available, or no work, etc. The reason for idleness is marked over the heavy black line.

The percentage of idle time is figured and marked at the right of each line and at the extreme right of the chart the percentage is shown as a total. In the use of the chart shown the working hours were 7 to 12 and 12:30 to 5:30. If this chart is kept up daily, any trouble in the shop will be sighted quickly and steps can be taken to remedy matters before they have gone far.



General Export and Import Conditions

CUSTOMS figures show that the foreign trade of the United States is increasing. During the first 100 days of the current fiscal year the receipts at the various ports of the United States totaled $140,000,000. Treasury Department officials, according to the *Journal of Commerce* (New York), are well pleased with this showing because the receipts for the same period in 1921 totaled only $77,000,000. They declare that receipts are keeping up beyond expectations, and insist that the new tariff will not cause them to drop nor occasion a decrease in the importation of foreign merchandise.

It is pointed out that customs receipts have never heretofore averaged $1,000,000 a day. Since July 1 of this year receipts are $40,000 above this average, and department officials estimate that by the end of the fiscal year an even greater increase will be shown. In judging this opinion the reader should bear in mind the possibility that the large importations recently were due, in part at least, to a desire to get goods in before the passage of the new tariff act.

Treasury Department officials, basing their opinion on conversation and correspondence with importers, believe that the widespread impression that the tariff will choke off imports is incorrect. Exactly the reverse is true, they think. Many of the importers who have visited Washington to discuss the tariff with these officials have let it be known that what they most desire is to avoid litigation, intimating that the amount to be paid to the Government in the way of duties could easily be passed on to purchasers in most cases.

The Treasury men say that they have not heard of orders for foreign merchandise being cancelled. The importers are seeking all kinds of information, which leads the officials to think that they will increase their activity.

Automotive

THE sale of light cars in Mexico will probably be increased by the newly developed fondness of the inhabitants of Mexico City for taxicabs. Consul General Dawson says in a report to the Department of Commerce that although the taxi service there is still in the experimental stage, operators are much encouraged by the prospects of success. The Yellow Taxicab Company inaugurated a taxicab service in this city in April with 13 cars. Now the Blue Taxicab Company has started a service of 20 cars. Because of the condition of the streets, whether paved or unpaved, the upkeep on a taxicab is very high and for this reason one of the best known in the lightest of American cars is being used.

Cereals and Milling

EXPORTATION of flour will be facilitated by the Philadelphia tidewater terminal, which was to be opened on October 21. The terminal, which is situated on one of the big army base piers, was leased from the United States Shipping Board by a group of millers for the purpose of providing adequate facilities at seaboard for the accumulation of flour stocks and the economical loading of export flour.

Twenty years ago the United States was exporting three or four million barrels of flour more each year than it is shipping today. Exports of wheat, on the other hand, have grown about 60% in the past two decades. It is considered that our growing wheat export trade has been directly damaging to the flour business. The wheat trade has been aided by the possession of good facilities for storage at seaboard, and the flour business has suffered from the lack of such conveniences. It is hoped that the opening of the new terminal will help the millers to overcome this handicap, and enable them to regain some of their old business.

Chemicals

THE export trade of the United States in chemicals and allied products is increasing so rapidly from month to month that the Chemical Division of the Department of Commerce believes it is not unlikely that the total value for the year will exceed that for 1921. This statement is supported by the gain made during August; for while the value of these exports for the first seven months of 1922 fell 3% below that of the corresponding period of 1921, for the first eight months of the current year the value was less than 1% short of the January-August, 1921, total.

Going back over the returns month by month for these two years, the margin has been gradually lessened from 28% for the first quarter to less than 1%, as stated, for the eight months ending August 31. Should improvement continue at this rate, the export trade in American chemicals for 1922 will show an encouraging increase over 1921.

Clothing and Garments

PALESTINE offers an excellent potential market for clothing. Since the British have been there the people have turned to European styles, manners and customs. According to the American consul in Jerusalem, made-to-order suits can be purchased in that city at these prices: business suit, $27; dinner jacket, $38; morning jacket, $38; evening clothes, $45; sport suit, tweed, $35. At present Occidental clothes are worn by about 100,000 Europeans living in Palestine, and about 60,000 of the town-dwelling Arab population. There are no ready-made clothing factories in Palestine, and the tailoring shops are small.

Textiles form an important item of Palestinian imports, since the country is entirely dependent upon foreign-made goods for its supply. There is an active demand for cotton goods owing to the climate. It is estimated that of the total textile imports 45% are woolen, 35% cotton and the balance silk and minor fabrics.

Iron and Steel

JAPAN recently has been the best foreign customer of our steel manufacturers. Governmental and semi-governmental agencies in Nippon have been buying rails, nails and sheets. Inquiry for tin plate from this source has been rather active, especially from oil companies which contemplate the manufacture of oil cans. South American countries also are buying. The Chilean State railways not long ago asked for bids on a variety of materials entering into the construction of locomotives and cars.

Leather

AMERICANS prefer German gloves to French, according to the import figures. During the first eight months of 1922, 47,407 dozen pairs more of German gloves were brought into this country than had been imported in the corresponding

period last year, whereas the importations of French gloves dropped 162,576 dozen pairs.

Total imports of leather gloves during the first eight months of 1922 were considerably less than during the corresponding period of 1921. A decrease in the number of women's and children's gloves brought in accounts for the larger part of the general decline.

Lumber

EXPORTS of wood during August—the latest month for which statistics have been compiled by the Bureau of Foreign and Domestic Commerce—show a considerable falling off. The total declared value of all wood and manufactures of wood for the month was $8,853,820. Of this amount approximately $6,000,000 is represented by logs, timbers and lumber. The latter—boards, planks and scantlings—totaled 123,233,000 feet, valued at $5,160,397, which makes August the low month of the year, with the exception of July. The falling off is said to be largely due to the shrinkage of Douglas fir exports, which dropped 50,000,000 feet below the high record of March, 1922, and even below the monthly average of 1920 and 1921.

Machinery

EXPORTS of agricultural implements from the United States during the month of August were valued at $3,352,657, according to figures compiled by the agricultural implement division of the Department of Commerce. This is the first time that the $3,000,000 mark has been reached in any one month since July, 1921, and it is the highest figure attained since April, 1921, in which months the exports were valued at $4,081,333. The increase for August was 46% as compared with July, and amounted to $1,064,934. Should these figures continue to increase, even moderately, for the balance of the year, the total exports for the year, although not so high as exports for the years immediately preceding, will reach a figure that seemed hardly possible at the beginning of the year.

Exports for August, 1922, exceed those for the same month in 1921 by $1,294,258. This is interesting, not only as showing an improvement in the demand for American implements abroad, but also because it is the first month since February, 1921, when the exports for any month have been greater than those for the corresponding month in the preceding year.

Rubber

RUBBER exports are declining, but the 1922 figures are still ahead of last year. August was the third consecutive month to show a decline from the previous month. Nevertheless, the August, 1922, exports of rubber were worth $630,000 more than those of August, 1921, and for the eight months ending August, 1922, the total value is nearly $1,500,000 in excess of the corresponding period last year.

The increased value of exports in 1922 over 1921 has by no means been uniform. While all branches of the tire trade have enjoyed increased activity and the rubber footwear exports are growing in quantity and holding their own in value, the trade in mechanical rubber goods, druggists' rubber sundries, and other rubber manufactures has decreased in value.

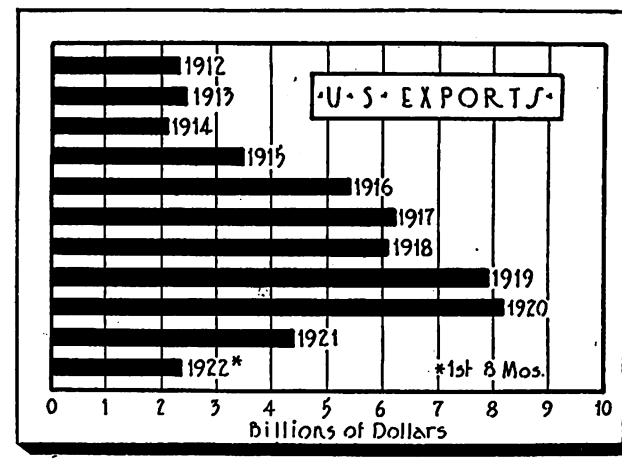
Several factors contribute to the increased tire exports for 1922. The tremendous accumulations of stocks in 1920 kept importations in 1921 low in almost every market; these stocks have now been absorbed. The number of automobiles in use is increasing all over the world. American tire companies are going after foreign trade more aggressively. The high quality of American tires is constantly becoming better realized by users everywhere, and recoveries in the exchange rates makes purchase from the United States less difficult for many countries.

Sugar

THE American beet sugar industry need not fear German competition in the world market for many years, in the opinion of Alfred P. Dennis, special representative of the Department of Commerce in Europe. Germany, he thinks, will never again be able to export 1,000,000 tons of sugar a year, as she did before the war. Perhaps in 10 years she may have a surplus of 500,000 tons, but for the immediate future she will have all she can do to supply domestic needs.

Germany for years has been the leading beet-sugar producer of the world. Second place in world production, formerly occupied by Russia, has now been taken by the United States. With production cut approximately in half by the war, the recovery of the German sugar industry is a matter of practical concern to American beet growers and sugar refiners.

For the past seven years Germany has been entirely out of the sugar export trade, and during the last season was under the necessity of importing 150,000 tons or more to cover absolute domestic requirements.



(Magazine of Wall Street)

U. S. exports in billions of dollars, 1912 to end of first 8 months of 1922.

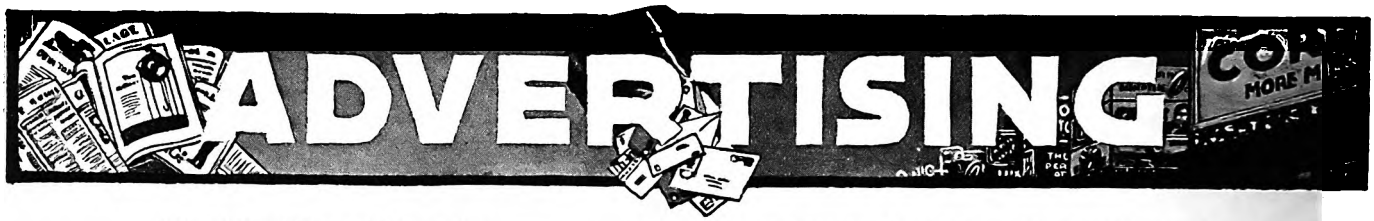
Within the territory turned over to Poland by Germany under the terms of the peace settlement were 296,400 acres of beet-sugar land. Indeed, some of the best beet-sugar soil of the old empire was in the Posen region and the so-called Danzig corridor. With the territory there also passed to Polish control two sugar refineries and upward of 30 sugar factories. Experts estimate that 450,000 tons of sugar production has been lost to Germany by territorial cession out of the 2,700,000 tons of pre-war sugar capacity.

Textiles

MANY foreign countries which hitherto have done little cotton manufacturing are now developing that industry rather extensively. In the long run this will no doubt hurt our cloth and yarn export trade, but for the present its effect is merely to stimulate the exportation of cotton yarns. Shipments of American cotton yarns in 1921 went to more than 50 separate markets, Argentina, Canada and Hongkong leading. The world's pre-war foreign trade in cotton yarns, excluding thread, was close to 1,530,000,000 pounds a year, valued at $360,000,000.

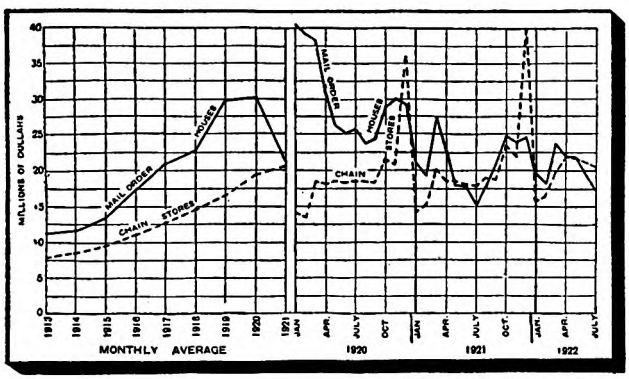
Industry's Output Increasing

A NEW business survey recently issued by the Department of Commerce says that the production of American industry is now greater than at any time since the period of depression two years ago. This increased output is general.



Advertising Value of Circulation

WHEN the late Mr. Mapes of Cream of Wheat—one of the shrewdest buyers of advertising space in America—laid down the rule that publishers should not only receive, but *keep* at least 50% of their subscription money, he made a step in the right direction. *National Advertising* proposes to take another step; the publishing in audited circulation reports of



(Bureau of the Census)

Sales by mail-order houses and chain stores.

figures answering this question—*how much do your subscribers want your publication? Answer in dollars and cents!* This magazine reasons thus, "any popular-priced publication of general interest can, with premium, contest, instalment or some other strong-arm method of getting circulation, add a 100,000 or two to its circulation in a month or so. But what is this circulation worth to advertisers?

"The only subscriber for a publication that is of any value to the advertiser is the subscriber who buys the publication because he wants to read it. Here are the two facts we, as national advertisers, want to know: Fact one, number of copies distributed—by months; Fact two, net amount of money received from subscribers by months, deducting all payments to subscription agents for commissions, premiums, expenses, etc., etc., etc."

The advertising value of every publication is first indicated by the amount the subscribers pay for it—expressed in dollars and cents, and second, by the amount the publisher *receives* for it—$5 or 5c. Would it mislead the advertiser as to the character of a publication if he knew these facts?

Shall We License Ad Men?

A SPEAKER before the Pittsburgh Advertising Club recently offered a resolution that advertising men should be examined and licensed in the same manner as other professional men before being admitted to practice. Attorneys, dentists, physicians and teachers all undergo an examination before practicing on the public. The difficulty in the case of the advertising profession is that there is no agreement as to what constitutes a good advertising man. Churches examine clergymen upon their own standard of qualifications. State boards examine physicians as to their qualifications, but no one as yet has devised any standard by which advertising men may be measured. To be sure, advertising agents must obtain "recognition" from publishers or others who sell advertising. This recognition depends to some extent on their business ability, *i. e.*, the capacity to keep accounts and handle them efficiently. In China public officials are selected by competitive examinations and yet China can hardly be called the best governed country. The same may be true of the advertising profession.

An Ad Man's Library

SAUNDERS NORVELL, chairman of the board of McKesson and Robbins, picks the following books as the ten most valuable for salesmen:

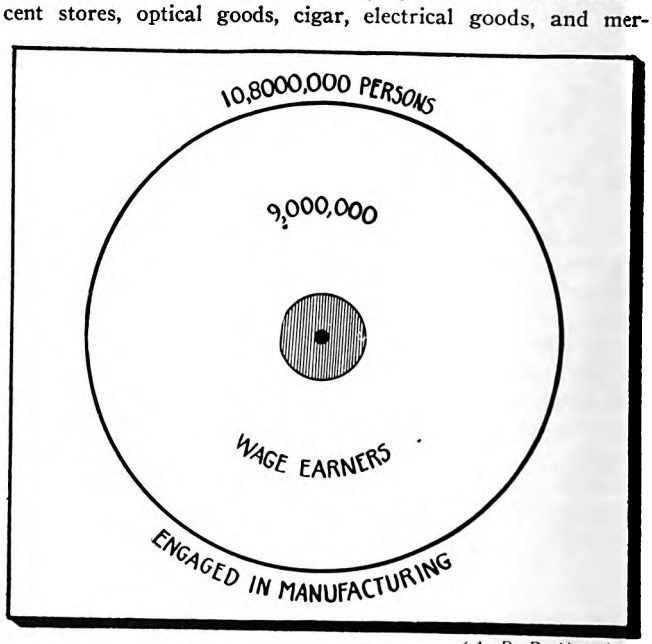
"The Selling Process" by Norval A. Hawkins, "How to Sell Quality" by J. C. Aspley, "Salesmanship" by William Maxwell, "Field Tactics for Salesmen" by J. C. Aspley, "The Wealth of Nations" by Adam Smith, "Approach to Business Problems" by A. W. Shaw, "Modern Sales Management" by J. George Frederick, "Modern Sales Organization" by J. C. Aspley, "Sales Management Practices" by J. C. Aspley, "The Go-Getter" by Peter B. Kyne.

A Million Retailers

THOSE who prepare national advertising campaigns are often in a quandary about the number of retail stores in various lines. The following table will be of interest in this respect:

36,746 dry goods and department stores.
45,600 retail clothing stores.
58,118 retail shoe stores.
334,336 retail grocery stores.
26,813 retail jewelry stores.
25,980 retail furniture stores.
29,660 retail millinery stores.
19,151 retail meat markets (exclusive of grocery stores).
15,773 retail music stores.
48,256 retail drug stores.
42,780 retail hardware stores.

Besides the above 11 lines, which total some 683,213 establishments, there are enough candy, book and five-and-ten-cent stores, optical goods, cigar, electrical goods, and mer-



(A. B. P. News)

There are 10,800,000 persons in manufacturing plants. The shaded area represents the number of "salaried employees," and the small black center shows the number of proprietors and firm members

chant tailoring stores, wall paper, sporting goods and other kinds of stores to bring the total above one million, or about one retail store for every 110 inhabitants of the country.

Out of all this there are less than 40,000 retailers in the United States, or less than 4% of the merchants available for membership, who belong to any national retail organization, while the percentage belonging to State organizations is even less.



A special page of industrial advertising in the "Jiji Shimpo." Notice the absence of column rules and the specially designed heading.

Foreign Advertising in the Orient

THE accompanying advertisement taken from a recent issue of the *Jiji Shimpo*, the leading Tokio newspaper, shows the extent to which foreign advertising is finding its way into the Oriental press. In this regular morning edition of the *Jiji* there were no less than ten advertisers of American products all occupying a fairly large space, according to Japanese precedents. The page reproduced is a full page on industrial advertising appearing under a specially designed banner heading illustrating the purpose of the page. According to *Editor & Publisher*, which reproduced the page in a recent issue, American advertisers' campaigns conducted in Japan have had considerable influence on the advertising copy of this country:

"Effective illustrations were first stressed here by American advertisers, but the missionary work along this line has yet some distance to go before being carried to its logical conclusion; that of bringing advertising copy in Japan up to a standard which compares with American newspapers."

In the centre of the page shown here is an advertisement of the Vacuum Oil Company; directly to the right is the copy of a Japanese importing firm which handles American elevators and heating equipment. In the lower left hand corner of the same page is an advertisement of Cleveland twist drills, and on looking closely at the trade-mark cut we notice that the make-up man in Tokio sometimes reverses his plates much after the fashion of his Western brother. The space immediately above the Vacuum Oil advertisement is that of Babcock & Wilcox—almost solid reading matter and almost entirely without illustration.

Good Business in Prospect

ACCORDING to the *Fourth Estate* advertising agencies are entering into the new year with high hopes and fine encouragement. James O'Shaughnessy, executive secretary of the American Association of Advertising Agencies, states that "the operations of the agencies in our association, viewed in the aggregate, act as one of the clearest guides to the ensuing business year. This is true because advertising appropriations are based on sales, the prospect of sales and the power of advertising to produce sales. Increases in advertising appropriations are automatically followed by increased sales. The volume of business done by our members is so great in relation to the total of all national advertising that for the purposes of forecasting it represents the entire field. While the accompanying list of advertising agencies in the United States contains upwards of 1200 names, the membership of our association embraces only 133 advertising agencies. These agencies, numbering only 133, handle about 90% of the total volume of national advertising appropriations handled by advertising agencies. . . . Having this knowledge of such a large percentage of the total of national tonnage, we

NUMBER OF ADVERTISING AGENCIES

Listed in this issue (including branch offices) as compared with the list of April 1, 1922 and November 5, 1921.

	Oct. 1922	April 1922	Nov. 1921		Oct. 1922	April 1922	Nov. 1921
Alabama	6	6	4	Nebraska	6	6	6
Arkansas	4	4	2	New Jersey	18	18	17
California	87	82	61	New York	414	407	391
Colorado	8	8	5	North Carolina	4	3	3
Connecticut	15	15	15	North Dakota	1	1	1
Delaware	1	1	1	Ohio	84	83	77
District Columbia	15	14	14	Oklahoma	5	5	5
Florida	5	7	5	Oregon	9	9	7
Georgia	11	10	9	Pennsylvania	109	91	84
Idaho	1	1	1	Rhode Island	5	5	5
Illinois	194	202	177	South Carolina	1	0	1
Indiana	30	27	23	South Dakota	1	1	1
Iowa	9	9	8	Tennessee	16	17	15
Kansas	6	6	6	Texas	21	22	21
Kentucky	6	6	4	Utah	8	8	7
Louisiana	4	2	2	Vermont	2	1	1
Maine	3	5	2	Virginia	9	9	9
Maryland	22	16	14	Washington	20	20	13
Massachusetts	84	84	77	West Virginia	7	7	7
Michigan	50	47	41	Wisconsin	11	13	8
Minnesota	22	24	18	Hawaii	1	1	1
Missouri	43	33	33	Porto Rico	2	2	2
Montana	7	7	7				

Total agencies in the United States	1387	1345	1211
Total agencies in Canada	55	48	48
Overseas advertising agencies	453	447	449
Grand Total	1895	1840	1708

The following cities have ten or more advertising agencies:

New York City	365	361	352	St. Louis	20	20	20
Chicago	189	197	172	Toronto	20	18	19
Boston	66	68	63	Montreal	19	16	16
Philadelphia	60	48	44	Seattle	15	15	10
Detroit	38	35	29	Washington, D.C.	15	14	14
Cleveland	36	37	36	Indianapolis	14	12	10
Pittsburg	35	31	32	Buffalo	13	11	10
Los Angeles	32	28	19	Minneaplolis	12	14	10
San Francisco	27	26	21	Springfield, Mass.	12	10	9
Baltimore	22	16	14	Atlanta	11	10	9
Cincinnati	21	19	17				

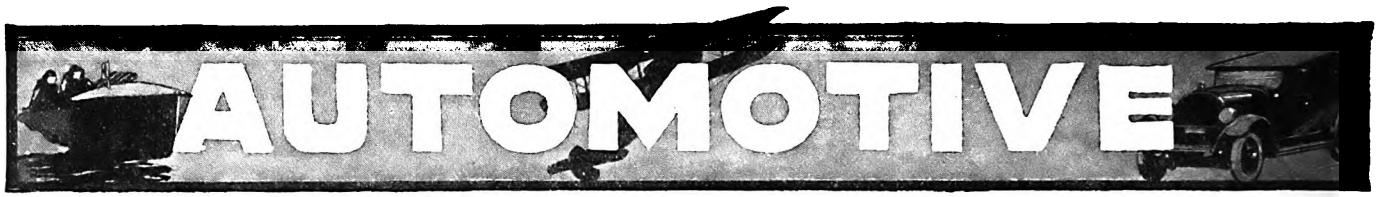
The revision of this list from that of April 1 last has involved hundreds of changes, growing out of consolidations, new agencies and others going out of business, changes of address, etc.

The geographic distribution of advertising. The "Fourth Estate" has tabulated the number of agencies in such a way as to indicate the growth and decline in various sections.

are in a position to say to the business world that business in the next 12 months will be good enough even for the most pessimistic to call it normal."

* * *

If a salesman were to call upon you and say "Safetite Securities—Better Buy 'Em" and walk out, you'd hardly be "sold." Are you doing the same thing in your copy?—W. S. MILLER, *Advertising and Selling.*



September Production Biggest on Record

THE production of motor cars and trucks continues at a high rate. The output during September is estimated by *Automotive Industries* at 206,000 cars—the largest September production in the history of the industry. This is an increase of 31% over the mark set a year ago. The previous high record was 185,000, reached in 1919.

"Regardless of what may happen in the last quarter," says the magazine, "1922 will see a production of more than 2,000,000 cars and trucks. For the first nine months of the year a total of 1,873,000 has been reached."

This high production leads most observers to adopt a most optimistic opinion of the prospects of the industry. The motor trade has had a prosperous year, and it is expected to prosper even more in 1923, especially since it is believed that general industrial conditions will be much improved. The *New York Evening Post* points out, however, that increased production means increased competition for sales. With intense competition, and with the marketing of motor cars placed on a basis where orders go to the seller offering the greatest value, this paper adds, only the strongest can survive. Elimination of some firms, possibly by merger, is therefore to be expected.

Production of motor cars can increase greatly before the "saturation point" is reached. W. C. Durant points out that there are not enough automobiles running today even to equip properly the 6,350,000 farms in the country. The automobile business, he adds, is in the same position in which the railroads were thirty years ago.

How Ford Works Out His Assembly. A descriptive article dealing with the progressive assembling method of the Ford plant. This, it seems, is based on the two general principles that (1) a man shall never have to take more than one step if it can be avoided in any way, and (2) no man need ever stoop over. This necessitates placing the tools in such a way that they come to hand when needed, at the proper level and in the proper sequence, and that the work progresses along this same level. The first experiment along this line was conducted by the Ford Company in April, 1913, when flywheel magnetos were assembled in this manner, basing the general plan on the overhead trolley used by the Chicago packers. The net result, after some modifications and subsequent speeding up, was to cut the assembling time for this unit from 20 minutes to 5. That is, one man did the work formerly requiring four. When applied to the motor, one man was able to do the work of three. The article goes into considerable detail of the various plans tried out and those which have proved successful and have been retained and expanded. It gives the times taken for most of the standard groups. *Automotive Manufacturer*, 9-22, 3300 w. MAH.

Wheel Wobble and Other Steering Faults. An explanation, more or less technical, of the puzzling phenomenon of wobbling of automobile front wheels and several similar and, according to this author, related phenomena. He holds that wobbling is virtually impossible with a vertical steering pivot or with pivots in the central plane of the wheel, as well as with plain or stiff tight bearings. A. LUDLOW CLAYTON, *Automotive Industries*, 10-5-22, 4750 w. MAH.

Truck's Place in Railroading. A prominent railroad official analyzes the present transportation system and shows how the bus can be used by railroads to advantage, as well as trucks, one to collect passengers, the other freight. On less-than-car-load freight, the latter would be particularly advantageous, inasmuch as the service rendered by the truck in factory door loading and similar convenient unloading a few miles away, without transshipment would be appreciated and paid for at a figure which would prove profitable to the railroads. ELISHA LEE, *Power Wagon*, 9-22, 1700 w. MAH.

Motor Trucks on Eastern Farms. Summary of experiences of farmers in the Eastern United States, as compiled and analyzed by the Dept. of Agriculture. Article shows the sizes of the farms on which trucks are used, the sizes of the trucks used, the relation of truck size to farm size, the advantages and disadvantages of the various capacities from the farmer's standpoint, and other similar material. It is interesting to note that nearly half of the total number are of 1-ton capacity or less, while less than 2% of the total are larger than 2 tons. This means that the farmer uses mostly a fast light truck, because it fits both his needs and his pocketbook. H. R. TOLLEY and L. M. CHURCH, *Automotive Manufacturer*, 9-22, 4100 w. MAH.

German Railcar Departs from Conventional Truck Practice. Description of a new motor-driven railcar of German manufacture which departs quite radically from usual truck building practice, upon which the majority of railcars have been based. A tramcar type of body, frame and running gear is favored, two solid axles being used, spaced roughly one third of the body length from each end, also air brakes. The engine is a six-cylinder automotive type developing 75 hp., driving through separate gearset, thence by horizontal shaft to a central gear reduction, and then to front axle by inclined shaft. The engine is located, automobile fashion, at the extreme front end, but the system of gearing is such that it may be driven in either direction, the controls being in duplicate at the two ends B. R. DIERFELD, *Automotive Industries*, 10-5-22, 1840 w. MAH.

Control of Oil onto Cylinders Chief Lubrication Trouble. Discussion at recent meeting of the Detroit Section of the Society of Automotive Engineers on lubrication. Principal speaker started a strenuous argument when he declared that the chief troubles were over oiling through pumping too much oil to the cylinder walls, and that this may be avoided by proper location of the oil holes drilled in the crankpins in pressure systems. He advocated a new method of drilling and of hole location, namely the drilling of the crankpin hole from the inside instead of from the outside. He advocated also a form of piston ring which would expand in both directions, that is vertically as well as radically. Many prominent engineers took part in the discussion. *Automotive Industries*, 10-5-22, 1600 w. MAH.

Determination of Best Location of Wing Beams. Wing beam constitutes the largest single item of weight in the airplane wing panel: consequently, this is a big and important subject. The proportions must be such as to reduce weight to a minimum. Author gives a simple method for determining the best location and depth of section. In addition a tabulation of data for a large number of modern aerofoils, which more or less prove the author's method, is given. ROY G. MILLER, *Automotive Industries*, 10-5-22, 1600 w. MAH.

Carded Peeler Fabrics. Recently it has been found that satisfactory tires can be made with fabric produced from cotton of shorter staple than either Egyptian or Delta varieties, and fabric commonly known to trade as carder peeler has been developed which in present market sells at 16 cents per lb. below combed Egyptian and 9 cents below carded Egyptian. Many efficient and well balanced tires are being made that are delivering greater mileage than did tires produced some years ago, when only best combed Sea Island cotton was used. Much depends upon proper spinning of yarns for tire fabrics. Method of building up tire carcass is matter of utmost importance. *India Rubber World*, 9-1-22, 500 w. CJW.

The United States consumes two-thirds of the world's rubber production.—*Dearborn Independent.*

Motor Delivery in Cleaning Industry. In estimating number of trucks necessary, consider average and not maximum requirements, but do not overlook small surplus which will permit regular overhauling of entire fleet. Select trucks so that their full tonnage can be used, with weight of goods given first consideration over bulk. Actual conditions should govern use of trucks rather than set, inflexible rules. Trucks are used only when they afford greater advantage than any other agency of transportation available for that particular job. Depreciation, repairs, and interest on investment represent large share of cost of truck maintenance. Should therefore plan constant utilization, so that they may work as many hours as possible during their lives. P. L. SNIFFIN, *National Cleaner & Dyer*, 10-22, 1500 w. CJW.

Detonation of Motor Fuels. The presence of only a small percentage of an aromatic hydrocarbon in a paraffin fuel has but a slight effect toward suppressing detonation. This is in agreement with the practical observation made by those who have used benzol-gasoline blends that the addition of less than 20 per cent of benzol to a commercial gasoline or a naphtha exerts only a small influence toward causing the engine to give smoother operation. But when benzol is blended with paraffin fuels in larger percentages its effect increases rapidly as its concentration relative to the paraffin fuel is raised. This is due, in part at least, to the greater percentage of reduction in the amount of the paraffin constituent present as the aromatic content of the blend is increased. Toluene on the basis of volume more by pressure changes than cord tires. For well-inflated tires, either fabric or cord, the resistance can be expressed as the same function of the load for all sizes of tires. Non-skid tread offers from 5-8 per cent more resistance than plain or ribbed tread. E. H. LOCKWOOD, *India Rubber World*, 10-1-22, 2000 w. CJW.

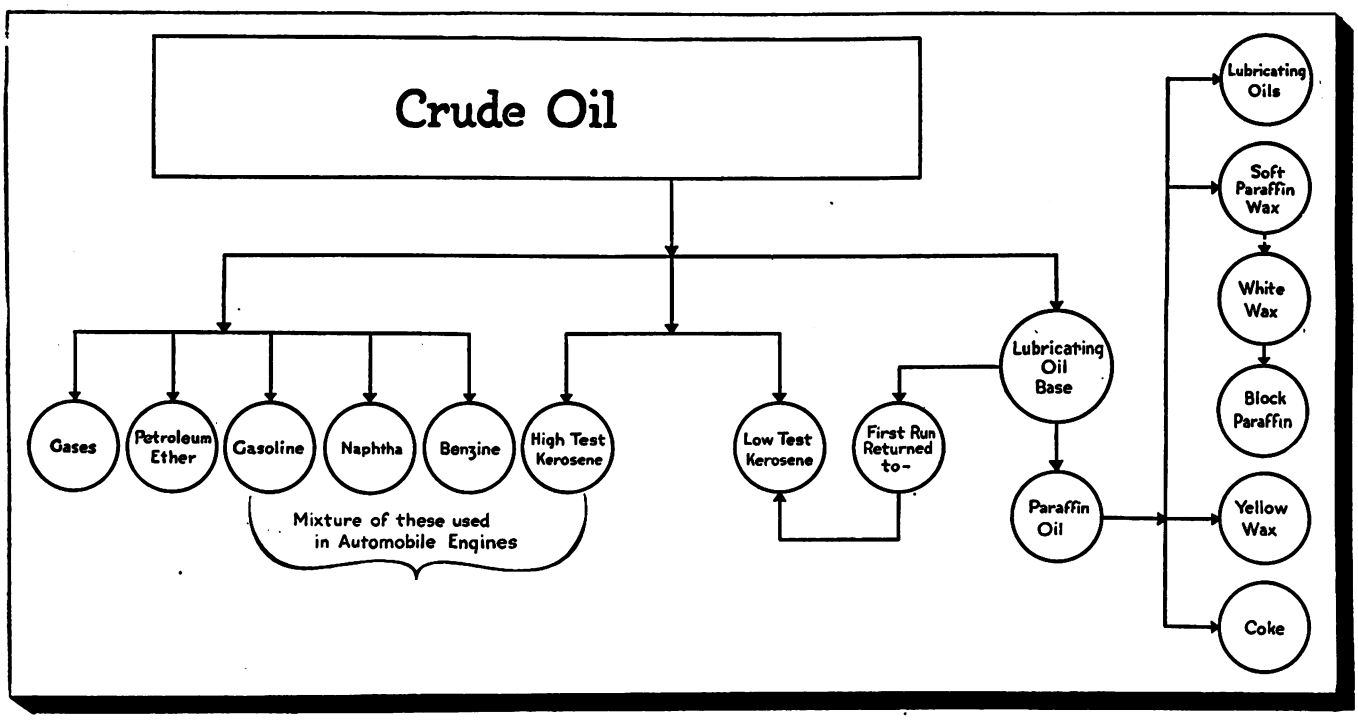
Enameling. Discussion of the introduction and development of electric heating for low temperature enameling. First difficulty to be overcome was ventilation, for restricted ventilation caused explosions. Two essentials in baking of enamels are uniform protective coating of enamel and maximum adhesion between the enamel and the work. Proper preheating of work necessary. Use of electric heat has been responsible for development of continuous conveyor type ovens of all types, shapes and forms to fit in best with a manufacturer's particular process or location. Description of certain installations. W. S. SCOTT, *Trans. Am. Electrochem. Soc.*, 9-22, 14 pp. CJW.

Tire Resistance. Method of measuring rolling resistance of rubber tires. Measured by the force or pull at the axle to overcome internal stresses in the tire as it flexes and rolls along. May be measured in pounds or in horsepower. Rolling resistance of solid rubber tires approximately 16 pounds per 1000 lbs. This means that with 10,000 lbs. total load, its rolling resistance will be 160 lbs. and at 15 miles per hour, this will be equivalent to 7 hp., all of which will be spent within the tire compressing the rubber and ultimately will appear as heat to be absorbed and dissipated by the rubber and metal rim. In the case of pneumatic tires, the values vary with the load and inflation pressure. Cord tire resistance is about two-thirds that of fabric tires. Fabric tires are affected

Machining of Camshafts. Author describes methods used to produce camshafts in the rough and then finish them, including the lathe operations, master cams and grinding methods, the necessity for uniform centers, and testing finished shafts. FRED H. COLVIN, *American Machinist*, 7-20-22, 1900 w. MAH.

Protecting Wood against Moisture by Suitable Coatings. Following an outline of the factors which causes expansion and contraction in wood, particularly as related to wood used in motor vehicle, the author points out that the moisture content of wood which has been dried should for best results, remain constant. The only way in which this can be effected is by the use of protective coatings. A number of these are described and the cost of their use, and beneficial results are listed from experiments made at the Forest Products Laboratory. CORNELIUS T. MYERS, *Automotive Industries*, 9-7-22, 2700 w. MAH.

Ideal Grease Rack. Description, with plan of economical design for grease rack, strong enough to carry heaviest passenger car; 20 ft. long, 6 ft. wide and 3 ft. 2 in. above level. This brings bottom of average car 4 ft. 6 in. from ground. Cost should be in neighborhood of $60. R. A. M. ANDERSON, *Petroleum Age*, 9-15-22, 600 w. CJW.



(Tractor World)

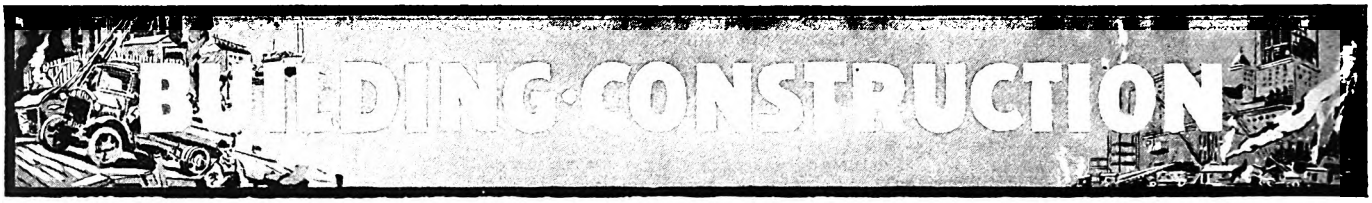
Flow chart showing distillation of crude oil into its various products and the composition of present-day engine fuel for automobiles.

Related Advertising

Solving your labor problems.....1795
Certified public accountants.....1791
Reliable investment securities.....1787
Visualizing the trend of your business with graphic charts and maps.....1730 and 1796

Related Articles

Export and import.....1762
Benzol blend.....1777
Copper in strong position.....1781
Mahogany.....1782
Railroads buying tools.....1783
Container cars.....1792



Building Boom Relaxes

INDICATIONS are that the peak of the building boom is past. September expenditures on construction, according to *Bradstreet's,* did not quite equal those of August, and since the August total was smaller than that of June or May, it is fair to assume that the 1922 boom is over. This does not mean that activity in the building trade may be expected to stop, but merely that the excitement is past and the industry is ready to settle down to a long period of deliberate work, until there are enough houses for everybody.

There is still a real housing shortage in 94 out of 146 cities and counties surveyed by the *National Association of Real Estate Boards.* The association reports an excess of high-class apartment houses in New York; in Boston there is no shortage; Charleston has a housing problem, but rents are going down; there are plenty of homes in Dallas; Harrisburg still has a shortage, although building operations have doubled; in Pittsburgh conditions are normal and rents steady.

In the South, according to *Record and Guide Management,* construction is still going strong. Activity earlier in the year was tremendous. In 84 cities of 16 Southern States where comparative building figures are available, $215,531,428 worth of new construction was commenced during the first half of this year, a gain of $64,563,723 over the corresponding period of 1921. The chart below shows the construction by States.

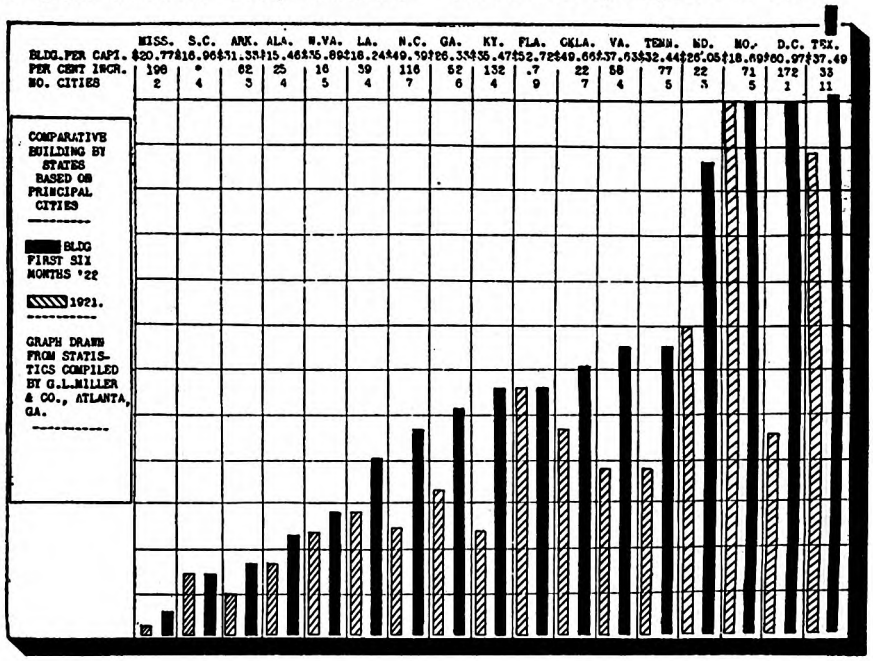
Estimating Building Excavation Costs. Gives figures for various classes of work, and covers nature of soil, disposal of top-soil, disposal of other excavated materials, location of dump, necessity of spreading, local rate of labor, and teams, cost of permits, necessity of protecting sidewalks, costs of watchman, lights and materials. CHAS. F. DINGMAN, *Concrete,* 9-22, 1200 w. CS.

Foundation Tests for Nebraska State Capitol. Describes methods and results of loading small and large test areas of sandstone and loose clay. Safe load of clay estimated at 2 tons per square foot, and bed rock at 15 tons. Architect using 12-ton unit foundation load in design of structure. *Eng. News-Record,* 10-12-22, 2000 w. CS.

Rebuilding and Fireproofing Wrecked Elevator. Description of methods used in rebuilding of Chicago & Northwestern grain elevators. Many difficulties encountered, owing to dangerous conditions of some walls, and where steel was distorted and concrete cracked there was no way to figure stresses. Elaborate precautions taken for fire prevention by installation of special electrical work, vacuum system and ventilators. GEORGE F. PAUL, *Concrete,* 9-22, 1200 w. CS.

Shoring, Needling and Bracing. Illustrated article covering uses and application of shoring, needling and bracing in altering and remodeling buildings. OWEN B. MAGINNIS, *Building Age,* 10-22, 1000 w. CS.

Consistency of Concrete. Report of work done by Building Research Board of England. Generally admitted that one of chief factors governing strength of cement concrete is amount of water used in gaging. Gives results of tests with several curves. H. O. WELLER, *Concrete Products,* 9-22, 1000 w. CS.



(Building Supply News)

This graph shows 42.7% increase in building in the South for the first six months of 1922 over the same period of 1921—(From figures compiled by G. L. Miller & Co., Atlanta, Ga.).

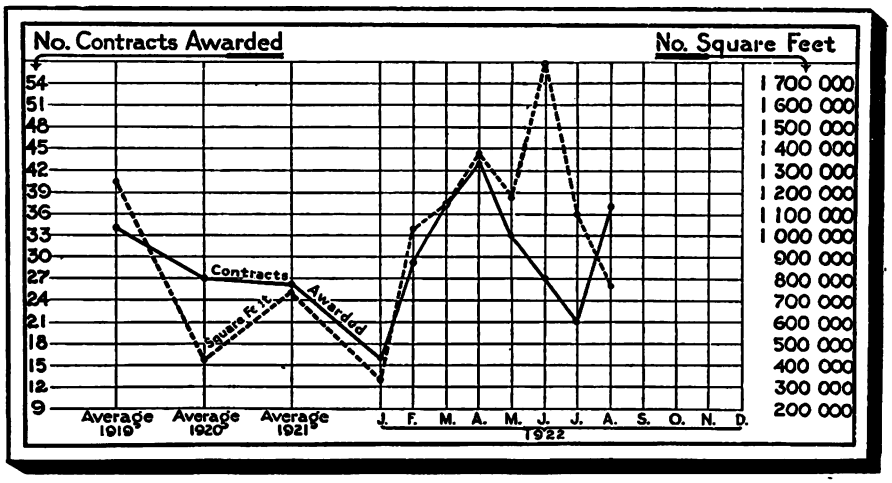
Lost Time in Construction. Part I. Covers causes of lost time in winter. Poor service, plant faults and inefficiency cut down construction year to one hundred days worked. Discusses winter idleness, rain and mud delays, plant delays, service delays, and delays of inefficiency. C. S. HILL, *Eng. News-Record,* 10-5-22, 1800 w. CS.

Lost Time in Construction. Part II, covering winter idleness. Gives cold weather conditions governing construction. Covers heavy construction, road building, municipal works and building construction. Methods of doing work in cold weather are well developed, but economics of year-round construction is the unsolved problem. Winter construction appears to offer economies by (1) spreading overhead costs; (2) reducing seasonal employment; (3) ironing out peak in production curve; (4) equalizing transportation demands. C. S. HILL, *Eng. News-Record,* 10-12-22, 2000 w. CS.

Some Fallacies in Concrete Proportioning Theories. Review of present-day practice and methods used in laboratory and field. Covers: slump tests, flow table, arbitrary volume proportions, void method, Fuller's theory of maximum density, surface area theory, water-cement ratio theory. Although concrete, owing to its method of production, will never be as uniform in quality as some other types of materials, there are no reasons why many of the uncertainties now involved cannot be completely eliminated. G. M. WILLIAMS, *Concrete Products,* 9-22, 2000 w. CS.

Methods and Cost of Laying Gas Main with New Joint. Covers description of 24-in. high-pressure gas main laid in St. Louis having No. 2 or alternative design of bell for cement and composition joints adapted by American Gas Association. Depth of No. 2 bell is greater than standard, lead groove is omitted and bell is tapered so that lead and cement space is greater at back. Estimated cost of labor, $3.60 per lineal foot, actual cost on this job was $3.39. JACOB D. VON MAUR, *Eng. News-Record,* 10-5-22. 600 w. CS.

Lighting of Modern Office Buildings. Very comprehensive article giving detailed suggestions as to type, arrange-



(Hotel Management)

The trend in hotel construction.

ment and wattage of lamps best suited for various office building requirements. Gives analysis of requirements for office space, halls and exterior lighting, with suggestions for arrangement, types of lamps and illustrations of typical installations. A. L. POWELL, *Bldgs. and Bldg. Management,* 10-2-22, 3000 w. CS.

Correct Illumination for Exteriors. Covers lighting of gardens, driveways and garages. Many practical and attractive advantages may be realized if proper attention is given to outside illumination. A. W. POWELL and H. A. SMITH, *Am. Builder,* 10-22, 800 w. CS.

Practical Stone-Cutting and Drafting. Part II. Covers three forms of arches in circular walls: cylindro-cylindric, cylindro-conic and radiant, with illustration of each. ED. W. HIND, *Stone,* 9-22, 800 w. CS.

Winter Concreting. Only a few years ago it was usual for a contractor to live twelve months on six or eight months' earnings. Today the contractor, in order to make reasonable progress, has had to put his business on a more scientific basis, planning his work so that it may proceed throughout the year, reducing unnecessary interruptions to the minimum. Covers methods of concrete construction in winter, with illustrations. A. J. R. CURTIS, *Am. Builder,* 10-22, 1000 w. CS.

Enamels and Enameling. Description of methods and care required in using enamel for exterior and interior finishing and decorating. Covers inside and outside work, composition, tinted enamels, tests, flat and glossy enamels, and durability. ARTHUR SEYMOUR JENNINGS, *National Builder,* 10-22, 1000 w. CS.

Tar Surface Treatment of Gravel Roads in Maine. Description of methods used by Maine Highway Commission for treating gravel roads with refined tar product by cold application. Covers: early experiments, cleaning before applying tar, sanding, standard practice, costs, and sweeping. PAUL D. SARGENT, *Municipal & County Eng.,* 9-22, 2500 w. CS.

Practice in Tar Road Construction in Great Britain. Surface tarring has been applied in Great Britain with advantage to old road surfaces in good condition and to new surfaces which are thoroughly consolidated and dried. Practice is to scrape or brush old road surfaces during spring months and make good any pot-holes, grooves, waves or depressions, and then apply tar by automatic sprayer or by hand. Gives specifications and methods in detail. *Eng. News-Record,* 10-5-22, 1500 w. CS.

Strengthening Gravel Roads with Tar Surface Treatment at Elgin, Ill. Elgin roads of pit-run gravel, screened to remove larger stones. Necessary to add new layer of gravel every one or two years. Used oil to lay dust. Now successfully using a bituminous material on the gravel and maintaining them as gravel roads with a bituminous crust. Gives details of results. GEO. E. MARTIN, *Municipal & County Eng.,* 9-22, 1000 w. CS

Drainage Expert Discusses Highway as Compared with Agricultural Drainage. Discusses advantages to highway engineers of agricultural drainage data. Very comprehensive article, with tables, covering: forms of soil moisture, gravitational moisture, watertable, capillary moisture, hygroscopic moisture content, forms of soilwater movement, thermal movements, evaporation, form of movement and factors governing it, relation of capillary movement to underdrainage, viscosity of moving water, etc. EDGAR A. ROSSITER, *Municipal & County Eng.,* 9-22, 3000 w. CS.

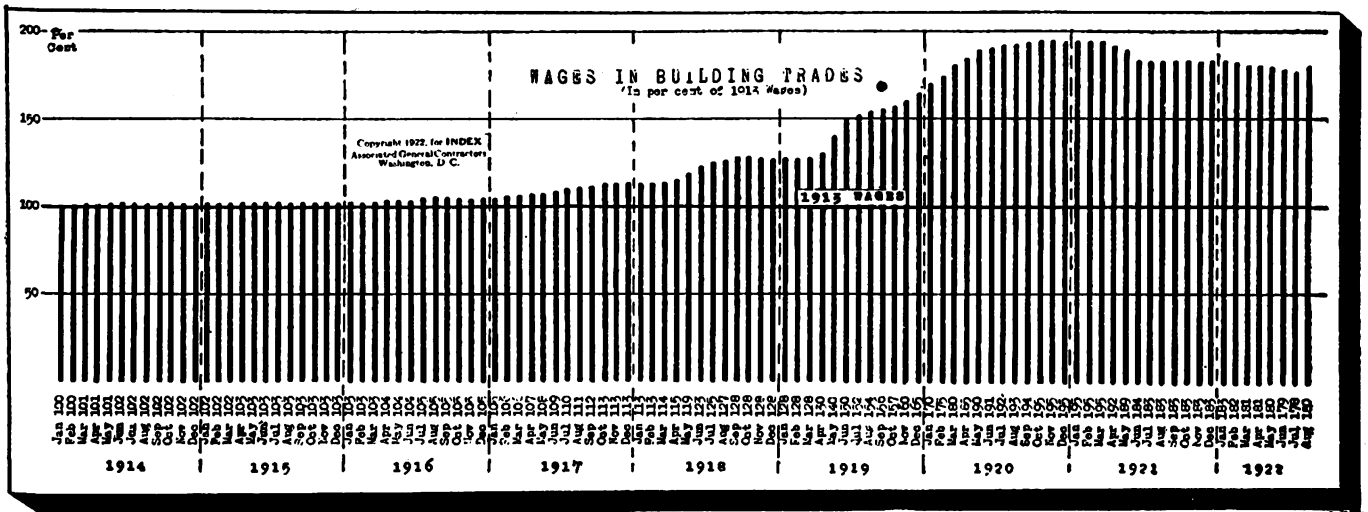
The Removal of Solid Material by Pumping. Pumping of solid materials by means of centrifugal pumps is being employed more and more in construction work and mining. To permit of employing this method it is necessary that following conditions exist: (1) material must be of such nature as to permit of its being immersed in water; (2) pieces must not be too large to go through pump; (3) ample and suitable water supply for mixing material must be available; (4) means must be available for disposal of waste water after dewatering material at destination; (5) cheap and ample power. This point discussed in detail. VICTOR J. MILKOWSKI, *Cement, Mill and Quarry,* 9-20-22, 800 w. CS.

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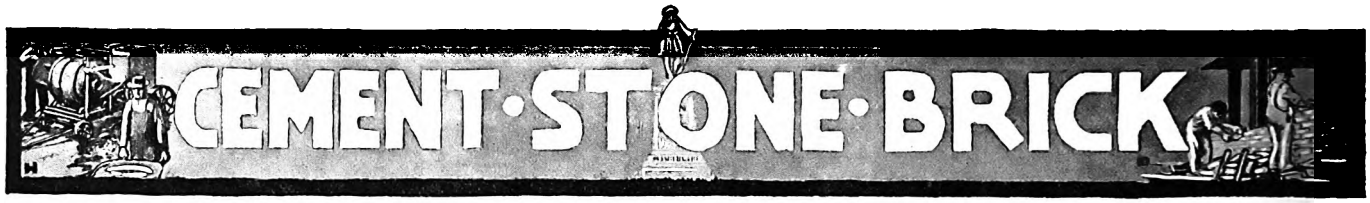
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(The Contractor)

Wages in the building trades since 1914, in terms of 1913 as 100 per cent.



"Pay No Dividends in 1922"

THE time is coming when the present abnormal demand, which is indicated by the chart below, for bricks and other burnt clay products will lapse, and it will be necessary once more to push sales of these commodities, says *Brick and Clay Record*. The trade is advised, therefore, to prepare itself now for the return of normal conditions.

Manufacturers in this line should pay no dividends in 1922, says this trade paper. They should put money into the improvement of their plants, and should accumulate a surplus. By using foresight in this way, the paper thinks they will stave off trouble later.

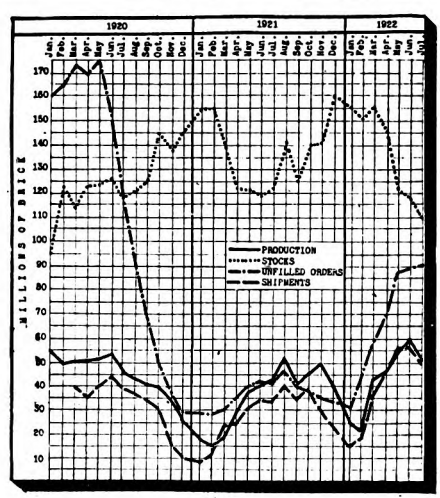
The cement industry is now confronted with a difficulty which might perhaps have been prevented by the exercise of foresight. According to *Dow Service Daily Building Reports*, the cement companies are without bags in which to make the shipments that the building industry demands. During the period when the cement mills could get no fuel, builders failed to return empty bags to them. Then, when coal began to come in, the railway embargo prevented the shipment of the bags. It is exceedingly difficult to get new bags because of the cotton textile strike, and the industry has therefore been held up. The conclusion of peace in the textile district, however, promises to relieve the situation. Little help is to be expected from the railroads.

Storage and Transportation of Portland Cement. Report of Bureau of Mines of investigation to determine cause of deterioration of portland cement during storage and transportation. Two feasible improvements suggested and described: (1) storage and transportation in bulk; (2) storage and transportation in form of unground clinker and grinding at destination. W. M. MYERS, *Cement, Mill & Quarry*, 9-5-22, 1500 w. CS.

Disintegration of Portland Cement. Until lately all failures of concrete in alkaline ground waters were attributed to defective concrete. No longer any doubt that well made concrete will not stand up long if in contact with alkaline waters. Outer layer softens slowly and all cohesion between cement and aggregate disappears. Discussion of constitution of cement, and process of hydration. Disintegration believed to be due to leaching out of free lime formed during hydration by sodium and magnesium sulfates in the alkaline waters. Only certain remedy is exclusion of sulfate waters of high concentration from contact with concrete. Manufacture of concrete of low permeability and high strength will lengthen life of structure. Tried efficient means for exclusion of waters not available. So-called electric cement not sufficiently tested to determine resistance to action of sulfate waters. T. THORVALDSON, *Engineering J. of Canada*, 9-22, 3000 w. CJW.

Cement-Lined Cast-Iron Pipe Tuberculation. Describes tuberculation of tar-coated cast-iron pipe at Charleston, S. C., seventy years' experience with cement-lined sheet pipe in many cities suggests cement lining for cast iron. Gives lining method. J. E. GIBSON, *Eng. News-Record*, 9-7-22, 2500 w. CS.

Utilization of Waste Heat from Rotary Cement Kilns. No effort was made prior to 1915 to utilize waste heat as kiln coal sold at 20 to 75 cents ton at mine; but with coal now at $5 a ton, conditions have changed. About 20% of cement plants are making use of their stack gases, saving an average of 40-lb. coal per barrel of cement. Gives description of complete plant using flue gases. JOSEPH BROBSTON, *Pit & Quarry*, 9-22, 2000 w. CS.



(*Brick & Clay Record*)

Production, stocks, unfilled orders and shipments of face brick, 1920, 1921 and 1922.

High Alumina Cements Have Great and Quick Strength. Discussion of French electric cement. Sets very slowly but attains great strength. Forms may be removed quickly, use of tile and piling almost immediately following casting of units. Successfully resists sulphate action of earth and water. *Cement, Mill & Quarry*, 9-5-22, 1500 w. CS.

Use of Concrete Drain Tile in Alkaline Soils. Engineer's report based on studies made in field and laboratory on concrete drain tile and sewer pipe, showing it unaffected by alkalies in soil and in water flowing through tile. *Concrete Products*, 8-22, 1000 w. CS.

Rules for Blasting Rock. Very comprehensive article covering blasting, giving rules and formula, illustrated with diagrams. DANIEL J. HAUER, *Pit & Quarry*, 8-22, 4500 w. CS.

Ottawa Feldspars. Historical discussion of Ottawa deposits. Mostly pink to red in color and contains from 12% potash and 3% soda to 6% potash and 5% soda. Description of individual deposits. N. B. DAVIS, *Canadian Mining J.*, 8-11-22, 750 w. CJW.

Report of Tests on Limestone Aggregate. Abstract of progress report of Research Division of University of Texas. Covers tests made with six different aggregates and five proportions of cements. *Concrete Products*, 8-22, 1500 w. CS.

Reversing the Washing Process. Description of Delaware plant where kaolin is made from rock, after going through several processes to refine and finish it for commercial use. Necessary separate 50% sand as by-product. Rather crude mining methods used. *Rock Products*, 8-26-22, 1000 w. CS.

Alumina from Clay. So many claims have been made that alumina may be prepared from clay that the Miguet process (U. S. Patent 1,376,563) was investigated. In this clay, lime and iron are fused in an electric furnace with a reducing agent (carbon). Using an excess of iron and carbon, a recovery of 30% of the alumina was obtained, but the prospects of its successful application are extremely poor. The cost of the material alone would be over $300 per ton. Not only is the silicon reduced but the other oxides present will be reduced in varying degrees. C. E. WILLIAMS and C. E. SIMMS. Bureau of Mines, Reports of Investigations, N. 2393, 9-22, 500 w. CJW.

Necessity for Trimming and Cutting Mica. Covers: cleaning, sorting, grading, trimming, splitting, manufacture of sheet and built-up mica, ground mica. OLIVER BOWLES, *Cement, Mill & Quarry*, 9-5-22, 3000 w. CS.

Practical Stone-Cutting and Drafting. Part III. Covers arches in circular walls, taking up two geometric problems: (1) to find the true length of a line which connects two points in space given by their projections; (2) to find the true angle which the line makes with either of the planes of projection. ED. W. HIND, *Stone*, 10-22, 1000 w. CS.

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World Wheat Production Declines

THE prospect for a good market for this year's American wheat grows better and better. The Department of Agriculture reports a decline in total world wheat production estimates, excluding Russia and Mexico. The estimate now is 3,012,293,000 bushels. The revised estimate for the same countries last year was 3,049,074,000, and the previous estimate this year was 3,093,870,000 bushels.

World crop estimates for other cereals show a similar trend. Estimates based on 18 producing countries indicate a loss of 168,000,000 bushels in the oat crop as compared with last year. Heavy losses are reported from Italy, Netherlands, Belgium, Germany, Denmark, and Czechoslovakia, but these are partly offset by gains of 22% in Poland and 14% in Rumania. The oat crops in Belgium, Hungary, Finland, and Latvia are all slightly above the yield of last year.

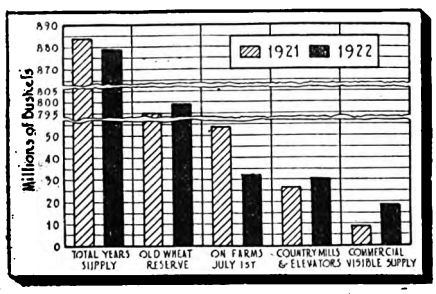
The outlook for increased fall grain sowing is not encouraging. The British farmers are much depressed by the low prices for grain and potatoes, and it is thought that much arable land will revert to pasturage. The Portuguese farmers are reducing their acreage in response to the low domestic grain prices fixed by the government. The export restrictions imposed by Rumania upon Jugoslavia in order to provide cheap food for home consumption will have an unfavorable effect on the autumn sowings unless it is so modified as to permit the farmers to enjoy prices more in line with the world market. The cut-rate requisitions of grain by the German Government will likely curtail the fall sowings in Germany, though the low prices of first deliveries of domestic grain in October have been revised upwards to meet the recent heavy drop in the national currency.

Grading of Wheat. Discussion of Government work on this subject. Certain factors open to interpretation, such as what constitutes damaged wheat, heat damaged wheat, class determination, odor, color and texture. Other grading factors, such as moisture content, test weight per bushel, dockage and inseparable foreign material can be mechanically determined. Protein and gluten content of wheat should not be incorporated into set of wheat grades at present time. Method of operation and efficiency. R. S. SAUNDERS, *Dixie Miller*, 8-22, 1200 w. CJW.

Protein Test. Protein tests are indicative of very little unless accompanied by statements about quality of gluten. This requires use of experimental mill for making flour. Difficult to express gluten quality in definite terms but gluten report of experienced operator in set of samples means great deal more to many than quantity of proteins. Bread is final test of flour. Easy to overestimate value of mere protein. What really counts is way flour actually works in housewife's kitchen or in commercial bakery. L. R. OLSEN, *National Miller*, 9-22, 1000 w. CJW.

Potato Flour. Potato flour utilizes second grade stock but superior to that used in manufacture of starch. Process consists in washing, peeling, sorting, cooking, macerating, dehydrating, grinding, bolting and packing. Machinery discussed for each operation. Elevation plan of building for plant. Yield of 20% may be expected, though this is maximum figure. In process no appreciable amount of valuable constituents is lost from original composition of potato. Cost naturally depends upon price of potatoes. W. A. NOEL, *Chem. Age*, 9-22, 2500 w. CJW.

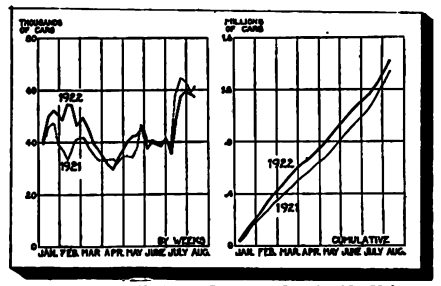
Milling. Modern system of milling based on proposition that better flour can be produced from clean middlings than from wheat berry direct and great majority of millers are firmly convinced that high breaking and consequent production of minimum of break flour is most desirable procedure. Adequate equipment for properly handling middlings produced must be provided. No very good reason for regrinding material which will pass through certain flour-cloth unless product of reduction can be bolted on finer mesh than that through which original material has passed. Corrugated rolls or scratch rolls have many advantages over smooth rolls. Some disadvantages and each miller must analyze his own problem. Personal experiences with the two. E. S. MILLER, *National Miller*, 8-22, 2500 w. CJW.



(Magazine of Wall Street)
Comparison of wheat supplies and reserves, 1921 and 1922.

Nearly 30,000,000 barrels of flour could be added to our annual output from wheat that pests and disease destroy.—*Dearborn Independent.*

Humidity and Mill Operation. Control of atmospheric humidity within mill would have beneficial results. With each increase of relative humidity there was an appreciable decrease in "invisible loss" occurring during milling and proportionate increase in total yield of mill products. Higher total yields were associated with higher relative humidities and with wheats of lower moisture content. No very pronounced relation between moisture content of flour and that of wheat before tempering was shown, nor was any definite relation established between air temperature and total yield of mill products. Possible methods of control. J. H. SHOLLENBERGER, *National Miller*, 8-22, 2000 w. CJW.



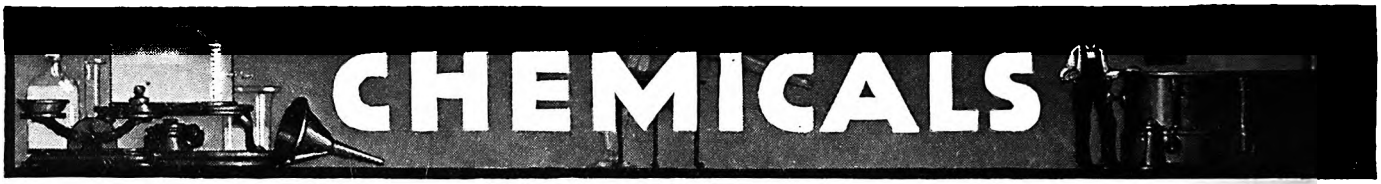
(Federal Reserve Bank, N. Y.)
Grain movements in 1921 and 1922. Grain loadings each week shown in section of graph at left; total loadings from first of each year through each week shown at right.

Protein and Gluten. Discussion of signifance of these two factors in wheat and flour and of the various methods of determining them. Protein methods capable of little higher accuracy and of closer check but they do not furnish any idea as to character or quality of gluten. When purpose of testing wheat is selection of samples from among those of widely differing qualities and characteristics, gluten test will be preferred, but when wheats to be tested are all of same general type and it is matter of sharp and accurate distinction between various lots, protein test will be employed. When baking test contradicts gluten test, baking test must be given precedence and gluten explained in light of past history of wheat and future performance of flour. At present matter must be left to each individual to decide which test is most suitable for his requirements. CHARLES H. BRIGGS, *Northwestern Miller*, 9-20-22, 2500 w. CJW.

Flow Sheet. First of series of articles which will analyze the flow sheet of flour mills and explain reasons for each step in milling program. Discussion of grading. Importance of brightness. Two plates show physical and chemical properties of the wheat kernel and the products (bran, short, low grade and clear flour). E. S. MILLER, *American Miller*, 10-1-22, 2500 w. CJW.

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Reparation Dyestuffs

THE chemical industry is still worried, according to *Chemical and Metallurgical Engineering,* over the report that the U. S. State Department has worked out a scheme whereby Germany can pay her bill for our Rhine army by shipping dyes to this country. The story, which appeared in the daily press, states that Secretary Hughes, after consultation with the Allied governments, has agreed to permit the United States to receive its share of German dyes without money payment, as has been the practice heretofore, the cost of the dyes to be credited to the American bill against Germany for the army of occupation.

Secretary Hughes declined to confirm or deny the report. The Textile Alliance, which formerly was the agent in the United States for the distribution of reparations dyestuffs, is quoted by *Drug and Chemical Markets* as saying that it has no knowledge of any negotiations for the renewal of German dye shipments, and that there is no arrangement between itself and the German cartel. No arrangement is contemplated, the Alliance says.

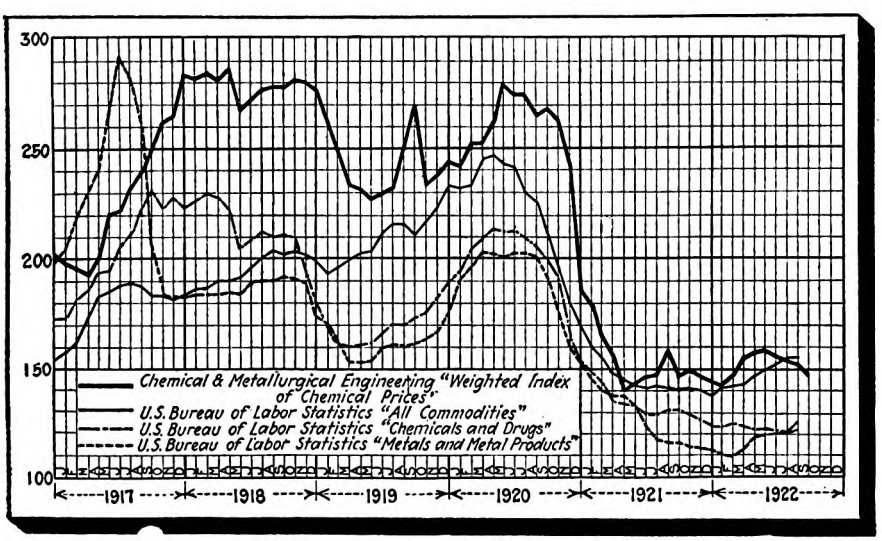
It is pointed out that in any case imported German dyes, even if they were brought here under an arrangement concluded by the State Department, would have to bear the newly enacted tariff duties unless Congress specifically directed otherwise.

The tariff, according to *Chemical, Color and Oil Record,* has affected the chemical market favorably, sending prices up. Items not directly taxed in the new bill have reacted sympathetically. Almost the only important chemical which has not joined the rise, according to this paper, is oxalic acid, which is feeling the effect of competition with import.

Standardization. Seems probable that standardization in chemical industry will proceed slowly for next few years and then go forward on an increasing scale and with increasing rapidity. Examples are standardization of grade of fertilizers, of materials and tests in paint and varnish field, cement, Baume table for specific gravity of liquids, etc. Tremendous opportunity for standardization of apparatus, tools and other mechanical equipment. Discussion of work of Am. Engineering Standards Committee. Standardization will provide more truly competitive market in which to buy equipment, make it easier to repair and replace chemical manufacturing equipment, reduce cost of manufacture, simplify keeping of cost accounts, increase production efficiency of industry. Important factor is standardization of shipping containers. *Chem. Met. Eng.,* 8-30-22, 1800 w. CJW.

Handling Materials. Chemical work is admittedly dangerous but at present time main hazards are due to poor working conditions caused by excessive depreciation and corrosion in plant. Serious explosions are rare, but they are an inherent hazard which must be guarded against with all possible precautions. Everyday job of safety engineer is to ensure that his equipment is long jump ahead of breaking point, that men engaged in handling dangerous materials are educated to their risks, and that they are provided with safest equipment and protection obtainable. Discusses hazards of gases, liquids, overflowing tanks, filling caustic drums, etc. W. G. Whitman, *Chem. Age,* 9-22, 1500 w. CJW.

The Chemist's Work. Field for chemist in plant routine is determined as much by alertness of administrative men of organization as it is by capacity of chemist himself. Size of plant, whether or not owners or executives are chemically trained, system of plant management and breadth of mind of administrative chief, determines movement of chemist from laboratory to plant, in which movement the outstanding determinant is capacity of man himself. Ideal plant chemist is a catalytic agent increasing resourcefulness of all with whom he comes into contact. He should set the pace for the sales manager. Production should dominate sale departments. Chemist, in general, leaves much to be desired in the attainment of this ideal of capacity. Usually in lack of thoroughness of chemical education in chemical and related lines. He also usually lacks faculty of salesmanship. Respect is commanded because of demonstrated ability and of that valuable faculty of making friends. Three important things to keep in mind are: reduction of cost of production, increase of output and improvement of quality. George L. O'Brien, *Chemical Age,* 8-22, 1200 w. CJW.



(Chemical & Metallurgical Engineering)

The trend of chemical and metal prices, 1917-1922.

Fire-Retarding Chemical for Wood. Factors influencing choice of such a chemical are: Salt must not attract water too much or the wood will always be damp. It must not affect tools of workman and also any metal fittings applied to the wood. It should not be poisonous in case a splinter should enter a person's hand. It should be fairly effective at low concentrations. It should not be volatile at ordinary temperatures nor soluble if used for outside work. It should penetrate easily. It should not affect the strength of the wood nor affect any decorative coating applied over the wood. Thus, it seems that the search for practical retardent chemical is beset with great difficulties, for those salts that are readily obtainable fail in one or more of these seven conditions. Chemicals tested fall into three classes. The fire promoters are cupric chloride, bismuth chloride, ferric chloride, alum, barium sulfate and stannic chloride. Those that have little effect on the wood are ammonium chloride, sodium chloride, boracic acid, and aluminum sulfate. Those that have a fire-retarding effect are zinc chloride, mixture of phosphate and borax, magnesium chloride, calcium chloride, ammonium sulfate, ammonium phosphate, borax, sodium silicate, and zinc ammonium phosphate. Ammonium phosphate was best of all tested, since it gives off an incombustible gas, ammonia, leaving orthophosphoric acid that melts and covers fibers of wood. W. O. Banfield and W. S. Peck, *Canadian Chem. and Met.,* 8-22, 3000 w. CJW.

Air Bleaching of Nitric Acid. Problem of bleaching nitric acid to be used in manufacture of mixed acids has assumed greater importance as specifications on lower oxide content have become more rigid. Process of bleaching consists essentially in volatilizing lower oxides present and removing them in a current of air. Rate of bleaching is found to be proportional to the rate of flow of air and to double with every 5° C. rise in temperature. Equation for rate of bleaching developed. In bleaching to fixed concentration of lower oxides, less nitric acid is lost at the higher temperatures, since the vapor pressure of the lower nitrogen oxides increases more rapidly with an increase in temperature than does the vapor pressure of nitric acid. W. G. WHITMAN and L. EVANS, *Chem. Met. Eng.*, 10-4-22, 1000 w. CJW.

Laboratory Aspects. The more exacting requirements are being met by American products. American dyestuff manufacturers are keeping closer to their standards than foreign makers ever did. Dyestuff fashions are changing. Silk and artificial silk industries, in their tremendous growth, an example of new requirements. Advance during last year has been in finer specialties, light fast scarlets, reds and blues, very fast service colors and brilliant developed colors. Users and makers of dyestuffs should be brought to cooperate to defray cost of real, broad scale research devoted to application of dyes. R. E. ROSE, *Am. Dyestuff Reporter*, 9-11-22, 500 w. CJW.

Chemical Control of Dyestuffs. Question concerned is how much a chemical analysis may assist in solving problem of man who is interested in purchase of dyestuffs for application to textile fibers. Three distinct problems: selection of right dye for right place, then picking best representative of this type and maintaining original standard. Four methods of analysis are described; so-called colorimetric comparison; titration of solution of known strength with titanous chloride, estimation of nitrogen by Kjeldahl method and quantitative determination of substances other than dyestuff. Three of these are applicable to testing of a typical acid color, while two—the titration and nitrogen methods—are applicable to the representative basic colors. Only one—the nitrogen analysis—is entirely satisfactory in connection with the particular sample of the direct type which was chosen for experiment, although the titration method has been used quite successfully with a number of other direct colors. W. M. SCOTT, *Am. Dyestuff Reporter*, 9-25-22, 1800 w. CJW.

Examination of Dyestuffs. First step consists in study of dry sample, by means of which mixture may be detected. If this is not satisfactory, color reactions formed by addition of acids and alkalis to solution of dyestuff will help. Procedure then becomes one of comparison. Important specially in case of direct cotton dyes. Action of metallic salts, such as chrome alum, chromium fluoride, copper sulphate and bichromate of soda on dyed shade should be ascertained. Principal property to examine in connection with basic dyes is the solubility. Acid colors will require considerable attention. Accurate dyeing methods and proper judgment of dyeings thus obtained is foundation of color laboratory. One is useless without the other. L. W. SIDEBOTTOM, *Am. Dyestuff Reporter*, 9-25-22, 3500 w. CJW.

Dyestuff Industry of Latin America. Except as reserve Latin America has long since passed its peak of importance as source of dyeing materials. Because of attitude of Congress toward chemical industry, well to keep an eye on natural reserves. Romance of natural dyes. Logwood most important and has put up most determined resistance to conquering aniline dyes. Jamaician industry could be developed to meet full demands of American dye users if admitted free of duty. Process of manufacture. Second in importance of fustic, a yellow dye. Annatto of importance as food color, specially for butter, margarine, etc. Brazilwood is most noted of Brazil dyes, but of little commercial importance. Salvador only country that still cultivates indigo. Cochineal comes from Mexico, but is also largely supplanted by aniline dyes. Miscellaneous dyes. OTTO WILSON, *Chem. Met. Eng.*, 9-20-22, 3000 w. CJW.

Fastness-to-Light Tests. Impossible to predict fastness of dye from general knowledge of dye itself. Must be tested in finished product. Natural light too variable to be reliable test. Nitrogen filled lamp deficient in actinic rays, is hopelessly slow and of no commercial value. Quartz tube light is very rapid in action but it undergoes continuous deterioration with age so that tests made at different times may not be relied upon as uniform. Fade-Ometer employs violet carbon arc, mounted in cabinet with 40 specimen holders located at uniform distance of 10 inches from arc itself. This light gives at violet end of spectrum a very close reproduction of spectrum of sun. So arranged that light intensity and temperature duplicate condition in midday summer sun. Present specifications for fastness-to-light very loose and of no practical value. H. S. THAYLER, *Paper Ind.*, 9-22, *Paper Trade Jour.*, 9-14-22, 1500 w. CJW.

Steam in Chemical Industries. General discussion of use of steam, covering boiler room, engine room and distribution system, with special reference to the functions of the test engineer. Report on steam generation should be very brief and contain only those items which are of direct interest to management, such as total coal consumed, water evaporated per pound of coal, total kilowatt-hours of electric power generated, etc. Discussion of control instruments, influence of coal on power plant capacity, freed water, load, exhaust steam for process work, etc. H. B. REYNOLDS, *Chem. Met. Eng.*, 8-30-22, 2800 w. CJW.

Catalysis in Chemical Processes. Discussion by Prof. H. S. Taylor, of Princeton University, on the nature and role of catalytic reactions. Very brief résumé of a wide field. *Brass World*, 9-22, 1000 w. APS.

Peat as Fertilizer. No product used as base for fertilizers has so few objectionable and so many desirable properties, not the least of which are its great absorbing, drying and deodorizing qualities. It also prevents caking of any fertilizer mixture. Only correct method of determining availability of nitrogen consists in making actual growing tests and studying the yields obtained. When this is done, results are out of all proportion to what might be expected from study of chemical analysis for availability. FRED WIEDMER, *Fertilizer Green Book*, 9-22, 700 w. CJW.

Peat Utilization. Discussion of administrative phases, including field and plant operation and marketing of product. Things executive must know: ammonia content, drainage, acreage and tonnage output, local weather record, markets, etc. Extended use of peat as fertilizer will give farmer cheaper product, and enable him to use more per acre and fertilize more acres. J. N. HOFF, *Fertilizer Green Book*, 9-22, 900 w. CJW.

Paints. We will continue exterior application of paint along the lines we are at present using until we find a pigment that will chemically combine with the oil so that when shrinkage develops no small air pockets around the pigment particles will be developed to cause extremely rapid chalking. If we find a pigment that does combine with oil, the compound so formed must be elastic or plastic so that extreme hardness will not be developed which would cause the paint to peel. Zinc paint does not flow so well as lead paint and it therefore does not permit the oil to penetrate the wood to same extent as lead paint. Zinc paint has greater cohesion or hardness and at the same time less adhesion to surface than lead paint. This results in peeling. Paint perishing is due to shrinkage developed within the film itself. J. R. MACGREGOR, *Canadian Dyer Color User*, 9-22, 1000 w. CJW.

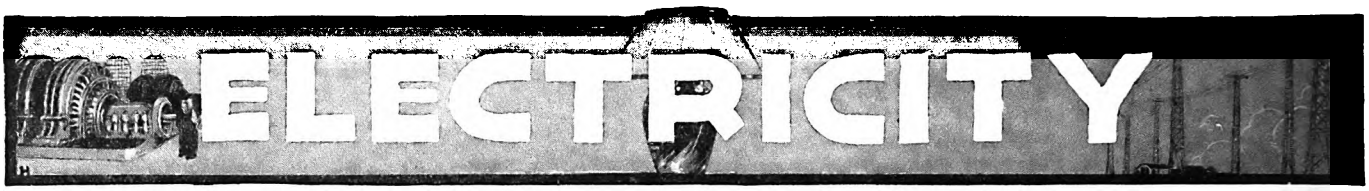
Decomposition of Xylenes. Study undertaken to learn decomposition products of xylene, with idea that result might be applied to coal carbonization. Some of the results follow: xylene was decomposed by heat and contact surfaces, under stabilizing influence of hydrogen and methane, into benzene and methane. Under other conditions crude toluene was formed, while if the atmosphere was rich in ethylene, higher boiling or solid compounds resulted. In contact with iron, amorphous carbon and gaseous products were formed. Metallic oxide surfaces are important and accelerate this reaction. Non-metallic substances, like charcoal, pumice or refractory material at like temperatures tend to decompose xylene into unsaturated and higher boiling compounds. The lower the temperature at which decomposition takes place, the more economical the reaction. Lower temperatures can be used in the presence of activated surfaces. M. J. BRADLEY and S. W. PARR, *Chem. Met. Eng.*, 10-11-22, 5000 w. CJW.

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Foresight or Nonsense?

BIG figures fill the air these days whenever the electrical industry is discussed. Anniversary celebrations seem to have imbued the trade with an expansive feeling, coupled with unlimited ambition. A characteristic statement is that of Frank E. Watts (appropriate name!) editor of the *Electrical Record*, who told the convention of the National Association of Electrical Contractors and Dealers that within the next six years more than $300,000,000,000 will be spent for electrification in the United States.

"How rapidly central power stations are expanding is indicated by the fact that last year the light and power companies spent $750,000,000 in new developments," Mr. Watts argued. "In the next six years they will spend $4,000,000,000 to extend their electrical service to the homes and factories in America.

"It is known for every dollar the central power stations spend in development, those who make use of this service expend in buying motors, home appliances, etc., an average of $80. So, within the next six years more than $300,000,000,000 will be spent in the additional electrification of America."

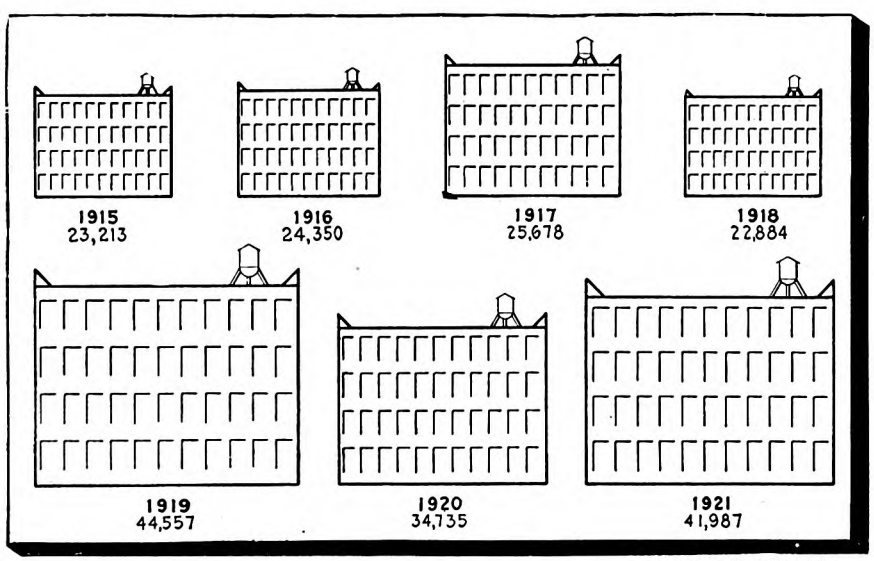
The *New York World*, under the heading, "An Overheated Imagination," says, editorially, that it considers Mr. Watts' statement "wild nonsense." It adds:

"The entire wealth of the United States in 1921 was put by the Government Loan Association at $300,000,000,000; by Edgar Crammond before the British Bankers' Association at $350,000,000,000 to $400,000,000,000. That in six years the country is not going to spend its entire wealth in a single line of endeavor, however urgent, needs no demonstration.

"No more beneficent work can be named than to put waterpower at work to save oil and coal. But because of its immense cost, direct and indirect, it must be done gradually. Dishonest newspapers do harm when they urge the impossible immediate development of all waterpower as an overnight cure for a coal strike. Enthusiasts who lose their heads may mislead public opinion with better intentions but equally bad results in disappointment."

Steel Mill Yard Electrification. System of electrification used in the steel plant yard is determined largely by plant energy supply, safety requirements, best locomotive designs, type of conductor system permissible and yard track layout. Each factor is discussed in detail. Electric power is extensively employed at the present time for certain classes of transportation work in and about steel mills with marked success. Extension to cover yard switching work is merely a matter of time. Economies are such as to justify this procedure from the previous experience in substituting electric motors for the stationary steam engine for driving rolls. Stand-by losses of the steam switchers are very great. Considerable time is lost in taking coal and water. Transportation of tender weight is a constant expense. Fuel consumption is excessive. Repair expense is high. A greater number of engines must be employed than with electric power. Electrification has always increased the tonnage which can be transported over a given track system. Energy supply for the electric locomotive is relatively small, due to its low speed, low current motor characteristic required for this service. Power demand is relatively intermittent. Installation of electric locomotives to perform the yard transportation service is an important step toward the perfection of the operation of the steel plant as a whole. D. C. HERSHBERGER, *Electric J.*, 9-22. IG.

Control of Gaseous Conduction. Devices employing conduction by gaseous ions have been handicapped by three main disabilities: the difficulty of placing the discharge where wanted, the tendency of the working gas to disappear and the decidedly erratic action. These difficulties have been circumvented in a large degree by the advent of a new principle, called the "short path principle," by which discharge can be prevented except where wanted. This has resulted in long life, for by placing the discharge in proximity only to certain porous materials, gaseous clean-up and disintegration are both prevented. Uniformity of action is also gained. By utilizing this principle gaseous conduction devices may be designed for example as rectifiers. V. BUSH and C. G. SMITH, *J. Am. Inst. Elect. Engrs.*, 8-22. IG.

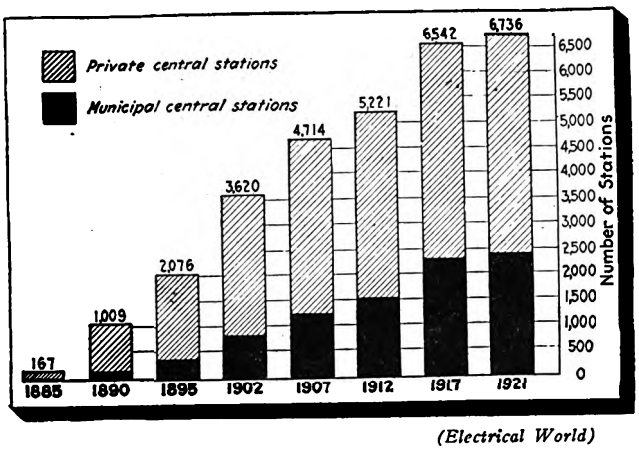


(*Electrical World*)

Number of new industrial power customers per year from 1915 to 1921, inclusive.

Resistor Carbons. The resistivities of several different types of carbon have been measured. These figures are of value in the design and operation of electric furnaces, since it is of value to know the electrical resistance of various reducing agents that may be used, and in the operation of melting furnaces the resistivity of the carburizer should be known. The difference in resistivities of various types and sizes of carbon resistors is not very large at 1000-1200°C. High resistivities are caused by the presence of volatile matter in the resistor material, the two bearing a direct relation for the same material. Ash within the particle of carbon increases contact resistivity and the thermal coefficient somewhat, but the effect is not nearly so large as is that of contained volatile matter. Extraneous ash or foreign matter of high resistivity increases the resistivity and thermal coefficient to a very marked extent. C. E. WILLIAMS and G. R. SHUCKS, *Trans. Am. Electrochem. Soc.*, 9-22, 13 pp. CJW.

Liquid Insulating Compounds. Liquids possessing high dielectric strength, which have low viscosity, comparatively high fire and flash points, have been subjected to the action of electric arcs at and below the liquid surface. The gas evolution, the nature of the gas and the amount per Kw. sec. arc rupture of certain dielectrics are given. There is a consistent decrease in gas evolution per Kw. sec. with the increase in molecular weight of the parafin. The liquid dielectrics are apparently broken down by a temperature pressure effect of very short duration, rather than by the sympathetic vibration and rearrangement of compounds by high frequency alone. The data reported have practical application in the operation of such apparatus as transformers, circuit breakers and condensers. C. J RODMAN, *Trans. Am. Electrochem. Soc.*, 9-22, 12 pp. CJ W.



(Electrical World)

Relation of privately owned central stations to municipal central stations since 1885. Private stations have always outnumbered municipal stations.

Automatic Substation. Operation of automatic substation is regulated by 8-day time clock, so set that the station will start at 6:15 and close at 4. At any time after close operation on following day can be prevented by pulling main operating switch. Designed to start either by pressing of push-button or by operation of time clock. Various relays and contactors are so connected and interlocked that they will perform same operations as attendant does in hand-operated station. After the unit is on the line delivering energy to the load, protective relays will anticipate every electrical condition and secure it against external or internal damage. Plan and description of operation of each part of system, including protective devices. *Coal Age,* 9-21-22, 2500 w. CJW.

Remotely Controlled Generating Stations. Description of plant of Ontario Power Co., which consists of 3 stations, 2 and 3 being controlled electrically from plant No. 1. Any load condition between full on and full off may be reached and held by manipulating the switch in plant 1. Synchronizing is accomplished by remote control of power nozzles. In 3 years no time lost because of shut downs. Elaborate system of protective devices to prevent overload, overspeed and hot bearings. To start plant after shut-down due to any of these causes, relays must be set manually, necessitating visit to plant. A. T. PARSONS, *J. Elec. West. Ind.,* 9-15-22, 1400 w. CJW.

Synchronous Converters. Synchronous converters have apparently given satisfaction in the comparatively small number of mining installations in which they have been employed for the conversion of a. c. to d. c. current. Preference for motor generator sets due to belief that they are most reliable and economical type of equipment obtainable for operation under actual service conditions existing in mining work. Recent developments consist in introduction of comparatively high reluctance in magnetic circuit of commutating poles of the synchronous converter and possible use of higher speed d. c. circuit breakers and of automatic substations for the greater protection and more economical operation of these converters. Fundamental argument remains about the same—that is, the inherently better efficiency of the synchronous converter transformer installations as compared with the motor generator installation. Details of developcents. J. L. McK. YARDLET, *Coal Industry,* 9-22, 2500 w. CJW.

Electricity Applied to Industrial Heating. Symposium at Montreal meeting of American Electrochemical Society. Generation and application of electric heat and the cost. High temperature furnace design discussed in paper by E. L. Smalley. Alloys used as electric resistors were discussed in another paper. Paper on granular resistor carbons. Other subjects discussed, some of which may later be abstracted from the complete reports, were heat insulating materials, electric heat treating of malleable iron, electric steam generators, new melting furnaces, electrolytic iron, electricity in enameling automobile parts and the dezincification of brass. *Iron Age,* 9-28-22, 4500 w. APS.

Tests of Relays. Telephone relays require very definite time-interval for their operation, a fact that becomes all-important in automatic practice. Methods of making tests. Results presented as curves, with the hope that they will serve as guide to action of other relays under like conditions. A. E. BURNS, *Telephony,* 9-23-22, 750 w. CJW.

Ornamental Street Lighting System at Lima, Ohio. New street lighting system comprises 1245 units extending over 16 miles of down-town business district. Candle-power of units not cut down for economy, as saving is small compared to initial outlay, which remains same for all candle-power lamps. Two circuits, extending throughout system, including street intersections and intervals between and alley intersections, are on all night. The remaining circuits are turned off at midnight. Disconnecting potheads installed in base of each post, which in event of post being broken, automatically disconnects unit, without short-circuiting entire line. Westinghouse type "C" lamps used. Gives details of circuits, units and spacing. ELMER MCCLAIN, *Municipal & County Eng.,* 9-22, 1000 w. CS.

Batteryless Radio Set. Electron tube amplifiers require both storage and dry cells as sources of current. Development of amplifier which can be supplied from ordinary 110-volt alternating current lighting mains of considerable importance. Discussion of preliminary stages that led to development of five stages of amplification, which includes 3 stages of radio-frequency amplification, galena crystal detector, 2 stages of audio-frequency amplification, loud-speaking reproducer and necessary power transformer and rectification circuits. This circuit gives good amplification, with slight residual hum, which is not great enough to be objectionable when receiving signals of ordinary readable strength. Alternating current supply gives as good amplification as direct current supply. May be assembled in 2 boxes, weighing about 42 lbs. P. D. LOWELL, *Telephony,* 9-16-22, 1500 w. CJW.

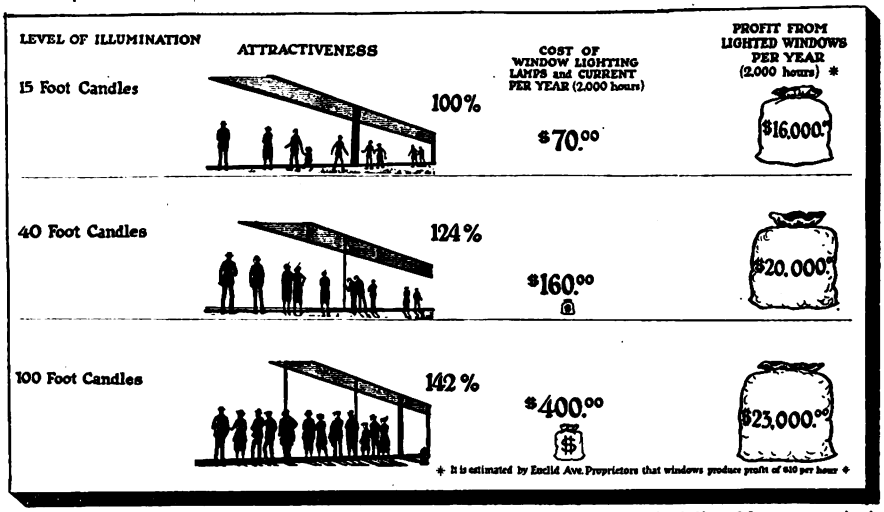
New French Electric Furnace. Furnace by T. Levoz meets the requirements laid down by Prof. Campbell. The furnace is closed as much as possible; the temperature of the slag is above that of the steel to secure fluidity and basicity necessary for intensive refining; heat is applied at center of bath, etc. Girod, Keller and Hewitt types of furnace compared. The Levoz furnace has two rows of electrodes, "fusion" and "refining." *Iron Age,* 9-21-22, 1800 w. APS.

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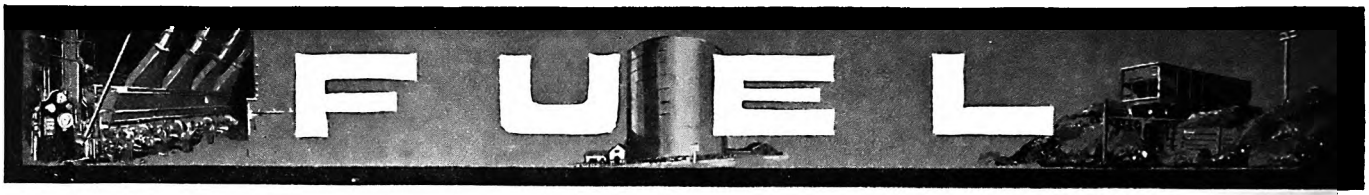
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(Buildings & Building Management)

Value of increased lighting in show windows, from tests in 20-foot windows of the Oppenheim-Collins Company, Cleveland.



"Leasing Heat"

THOSE who have sought to exploit the coal shortage by selling gas and gas heating appliances find that persons who rent the quarters they occupy are reluctant to invest money in apparatus to heat those quarters. This has led, according to *A. G. A. Monthly*, to the development of the idea of leasing such apparatus, as well as selling it outright.

The Peoples Gas Light and Coke Co. of Chicago, this magazine says, is leasing its gas radiators on a yearly basis to short term leaseholders of the following classes: (1) small manufacturers who rent lofts without sufficient heat; (2) proprietors of small retail stores without basements; (3) dwellers in bungalows in the newer sections of the city; (4) inhabitants of small heatless flats and apartments. The company is thus successfully stimulating the sale of gas.

Sales of manufactured gas in 1921 touched the new high figure of 326,000,000,000 cubic feet, according to a survey just completed by the *American Gas Association*. This is an increase of 7,000,000,000 cubic feet over 1919 and 20,000,000 cubic feet over 1920, the association says. The per capita increase of gas consumption throughout the country was 80% between 1911 and 1921, whereas between 1901 and 1911 it was only 30%. The growing use of gas by industrial plants is largely responsible for the jump in consumption, the association thinks.

Feeding Pulverized Coal. There are three stages of preparation for combustion: thorough diffusion and mixing, combustion, which should be practically instantaneous and heat application, i. e., imparting heat to work in hand, which should be done as directly as possible. Ratio of air to fuel should be about 5,000 to 1. Ideal condition will be to conduct certain amount of air within a volume of coal dust and by there turning it loose burst the particles apart in all directions. If we then subject this rough mixture to further treatment to create a large number of eddying currents we can insure uniformity of dust diffusion throughout entire volume of combustion air. It is more a question of heating air volume than coal particle itself to ignition temperature. This is an argument for elongated rectangular form of nozzle. If combustion is to be retarded somewhat circular nozzle may be more satisfactory. M. W. ARROWOOD, *Combustion*, 9-22, 1800 w. CJW.

Handling Coal. Cambria Steel Co. has developed new method of handling their coal. Well has been sunk depth of 115.4 ft. from upper bed to lower. Equipment includes trip feeder, car stop, rotary dump and trip maker in upper seam with automatic power-driven gates, trip feeder, etc., in lower seam. Capable of handling loaded cars in trips not exceeding 110 cars each, advancing and dumping at rate of 6-7 cars per minute. Trip feeders at this point are of chain type with hooks and have speed of about 65 ft. per minute. Standard car stop is provided at dump so that operator has position control of delivery of cars. Rotary dump is operated by 10 HP 250 volt direct current motor. Dump is so arranged that each car entering it will open the car stops and push empty car out at opposite end. In lower seam cast iron drum and 165 ft. of steel wire rope bring trips to trip feeder. This feeder is capable of handling empty trips not exceeding 130 cars each, advancing at speed of approximately 65 ft. per min. Loading apparatus consists of steel nose for bottom of coal well and second gate allowing coal to drop into car. Control of loading machinery is entirely automatic. Average weight of loaded cars is 5000 lbs. G. A. RICHARDSON, *Coal Age*, 8-31-22, 2000 w. CJW.

Coke. Over-quenched coke contains carbon of such quality that it readily combines with carbon dioxide gases at comparatively low temperatures near the top of the furnace. Furnace goes cold at hearth because not enough carbon gets down to the tuyeres, for the reason that it goes out the top of the furnace as carbon monoxide. Great improvement in quality or quantity of perfect product has been effected by rational methods of heat treatment and great improvement in metallurgical coke can be expected as soon as some intelligent heat treatment is devised in place of the present crude accidental methods forced upon the coke producer by commercial and engineering conditions. S. R. GREENE, *Blast Furnace*, 9-22, 1000 w. CJW.

By-Product Coking. Discussion of few subjects of investigation that may be considered typical of general trend of research. Includes property and process of coking, by-product formation, properties and utilization of coke, materials of plant construction and recovery of by-products and other developments. F. W. SPERR, JR., *J. Ind. Eng. Chem.*, 9-22, 3750 w. CJW.

Gas Burners. Ideal burner must be so designed as to assure formation as to assure formation of very intimate mixture of gas and air on its heating way and that the burner must be effectively able to cope with variations in gas pressures. Gas burner designed by Muller, which is described, serves these requirements better than many other types. Particular feature is that by means of fixed twisted blades, gas entering burner is forced to rotating cork-screw-like motion on its way of combustion. Operation of burner illustrated by experimental figures. A. THAU, *Blast Furnace*, 9-22, 1500 w. CJW.

Oil as a Fuel for House Heating. Gives details which customer wants to know about oil burning which must be answered to sell equipment. Covers: heat value comparisons, functions and types of apparatus, oil burner troubles, cost of coal versus fuel-oil, and effect on insurance. Illustrated. Y. ADAMS, *Sanitary & Heating Eng.*, 9-22-22, 1000 w. CS.

Gas for Industrial Purposes. Gas lends itself admirably to program of increased efficiency in industry. As industrial fuel it not only gives increased thermal efficiency, but also gives opportunities for increased production efficiency. With wide range of gases available, it is possible to choose kind of gas which has proper characteristics for carrying on heating operations in almost any industry. Glass industry example of industry which depends almost exclusively on gas as a fuel. Also used in enamel industry, in melting of non-ferrous metals, in annealing and heat treating furnaces, in carburizing of steel, etc. Advantages are found in cleanliness in use of gas and recovery of by-products of coal—tar and ammonia in particular. Prospects for more extended use of gas as industrial fuel. CARL J. WRIGHT, *Chem. Met. Eng.*, 8-30-22, 1500 w. CJW.

Double Gas Process. Coal is carbonized and coke converted into water gas in same apparatus. Generator is first filled with coke and blown to heat, blast gases passing round the retort, which is filled with gas coal, and heating it, then going through passage where it meets secondary air from riser from blast line and is burned completely. When making gas during the run, the steam enters above the checker brick and down to the blast main, thus passing under the grate and up through the hot coke, the hot water gas passing through the coal in the vertical retort driving off coal gas, both gases going to the hydraulic main. Savings include no firing of coal gas retorts, no heat lost by quenching coke nor through blast gases escaping hot. Steam is superheated and enters the generator dry. Also possible to use other coke or coals and even lignites in the generator. Greatest advantage is that gas without inerts can be made of uniform heat value of 358 to 392 BTU per cu. ft. Also claims much higher yield of tar and ammonia. Description of Bologna plant. ALBERT BREISIG, *Gas Age-Record*, 9-9-22, 1200 w. CJW.

Gas Applied to House Heating in a New Manner. Description of recently developed heating system using gas as fuel. Gases in combustion are circulated through hot water radiators, thus using most of the heat units. *Sanitary & Heating Eng.*, 9-22-22, 500 w. CS.

Oil Fuel. Amount of oil used depends chiefly on efficiency of the boiler. In general, fuel oil will give a higher efficiency than coal. Low efficiencies in coal plants, due in part to large amount of cold coal thrown on fire, firing is not continuous, larger percentage of excess air is usually required and larger percentage of clinkers is apt to collect on tubes. Another item is banked fires over night. Coal will vary from 9500 to 14,500 B.t.u. per lb., while fuel oil varies around 18,500 B.t.u. per lb. Calculated that 163 gal. oil equal to ton of coal. Various calculations given showing economy of burning oil. Warning uttered against various short formulas, charts and tables for obtaining relative value of coal and oil. They never tell the whole story. *Oil News,* 9-30-22, 3500 w. CJW.

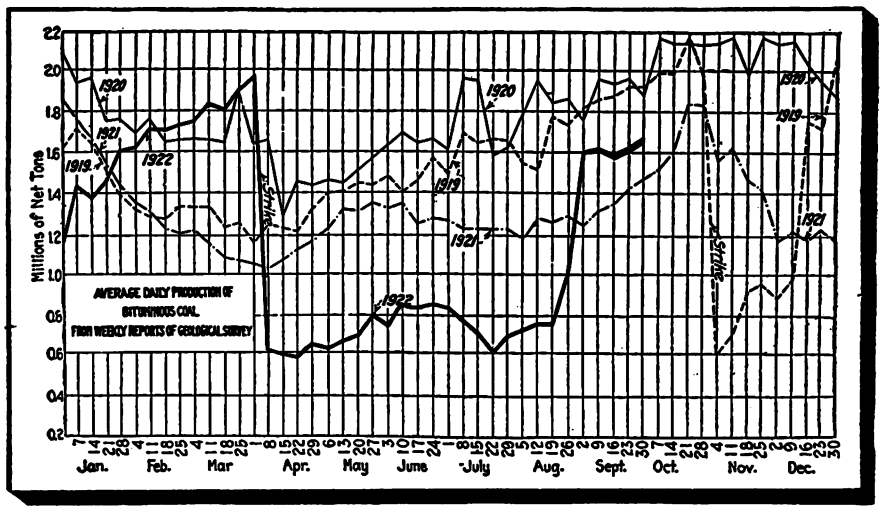
Oil Heat. Advantages in favor of fuel oil are that it does not deteriorate in storage, is not susceptible to spontaneous combustion, occupies about one-third space required for coal and may be stored underground. Cost of delivery to boiler room, lack of ashes, etc., decreases cost of fuel. Greatest saving in large plants. Primary importance to supply steam or air and oil to burner at constant and uniform pressure. Favorable analysis of gases depends largely upon fire box and damper arrangement as well as height and area of stack. In higher altitudes, taller chimneys are required, which means increased diameters. Mechanical method does not secure same degree of combustion secured by steam method. Reasons given. Fuel oil should be supplied to low pressure steam and hot water heating boilers with low pressure oil burning system. Average of 5 gallons of fuel oil are required for each square foot of radiating surface for heating season of 7 months. One pound of oil will evaporate 12 to 14 pounds of water. R. P. MAYNARD, *Oil News,* 9-5-22, 1500 w. CJW.

Eleven Years' Oil-Burning Experience. Gives description of drain tile plant using fuel oil for past eleven years. Covers complete operation, and gives suggestions for changing from coal to oil. MARK A. TAYLOR, *Brick & Clay Record,* 8-22-22, 1200 w. CS.

Benzol Blend. Ease with which benzol blends with light or heavy distillates and improvement over blends of petroleum distillates, brings it into a well-deserved position of best possible blend at present time. Blends must be made to specifications so as to make blend as nearly as possible uniform product. Carburation is almost perfect, vaporizes very readily under almost any temperature, dilution will be at a minimum and crank case vapors are very scant. Has tendency to make motor run quietly, due to excessive air taken in with fuel. Pure benzol not good fuel. Temperature should be as low as possible when blend is made; otherwise there will be trouble from moisture being absorbed from the atmosphere. W. F. STACK, *National Petroleum News,* 9-6-22, 750 w. CJW.

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(Chemical & Metallurgical Engineering)

Estimated average total daily production of bituminous coal.

Gas Plant Wrinkles. Discussion of number of valuable hints or wrinkles obtained from several gas companies. Headings only are listed here: Automatic coke quencher, tapping water tank of gas holder, ventilating governor hole, uniform coal weight, water-sealed oven valve, steam of reciprocating pump to drive lubricator, grease seal for gas exhauster stuffing boxes, steel turnings for scrubbing water gas, Service street tee safety stopper, planks used for purifier trays, tee with split sleeve for connection to low or high pressure mains, bench producer charging hole cover, stack draft to ventilate boiler drums while working in them, brick dome for water gas machines, replacing furnace arches under retorts in coal gas benches, safety chains for track hoppers, spray pond located on roof, reinforced concrete slab construction for coke quenching tracks in retort houses, brick boiler front, ventilating stacks for retort house quenching floor, special split sleeve for repair of breaks at joints on large cast iron mains. C. R. HENDERSON, *Am. Gas J.,* 9-23-22, 5000 w. CJW.

Naphthalene Deposits. Report of experience in naphthalene removal by flushing main with gasoline. Introduced under pressure if necessary at high point in main, until no unusual loss in pressure through area under treatment is noted. Gasoline is recovered from drips and used again in different locations until it becomes saturated with naphthalene. Only portion of gasoline is recovered. Length of main treated varies from several hundred to several thousand feet, depending on local conditions. Complaints have dropped from over 6000 in 1920 to 239 in first half of 1922. A. H. ANDERSON, *Am. Gas J.,* 9-23-22, 800 w. CJW.

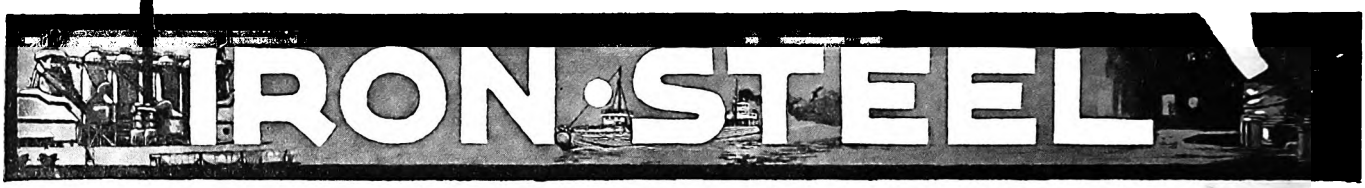
Tankless Gas Holder. Gas holder consists substantially of polygonal shell of sheet steel with roof above it and disk which moves inside of holder piston like and confines gas below it. Advantages include smaller cost of construction as well as lower operating costs. These include elimination of expense for heating of water and smaller maintenance costs for painting. Gas contained in holder is never moistened. Thus less water accumulates in water traps of gas mains. Operation of holder discussed. When filled with gas the leakage was found to be 0.696%. FLEISCH, *Gas Age Record,* 8-19-22, 2500 w. CJW.

Gaseous Fuels. Discussion of combustion of gaseous fuels judged from gas analysis or, more exactly, a plea for the better utilization of one kind of gas analysis, the waste gas analysis, and a warning against the indiscriminate use of another kind, the producer gas analysis. Also a discussion of the function held by those constituents of the producer gas which, being condensable, escape analysis and the results of some investigations into the nature of these tarry vapors. Absolutely impossible to tell from gas analysis whether hydrocarbons in the tarry vapors have been preserved or destroyed. What is required is, that side by side of the gas analysis another standard be placed, based on the luminosity (candle-power) of the gas. Formulas developed may be easily modified to apply to liquid fuels as well, provided the assumption is made that they, during certain stage of the combustion process, are gasified and dissociated into their elements. A. G. WITTING, *Am. Gas J.,* 9-16-22, 6000 w. CJW.

Molasses as Sugar Factory Fuel. The use of molasses as fuel, when burned with an injector, gave a calorific value of 1.66 kilos of water per kilo of molasses. Great increases in calorific value were obtained by mixing the molasses with other fuels of vegetable and fibrous nature. Straw and molasses gave 2 kilos and straw and bagasse gave 2.7 kilos. This increase is claimed to be due to the presence of the vegetable matter which makes possible the bringing of the entire mass to sufficiently high temperature to vaporize it completely and to let it burn with more economical results. ZUCE KOGAN, *Sugar,* 9-22, 1600 w. CJW.

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Steel Buyers Grow Wary

A DECIDED decline in buyers' interest in making purchases for forward delivery has been noticeable in the iron and steel trade, according to *Steel and Metal Digest.* The change may be followed by watching the fluctuations in the rate of steel production, the magazine says. If there had been no change in the general attitude of buyers, it points out, demand would have kept up, but as a matter of fact the rate at the end of September was not equal to the rate obtaining for some time prior to the latter part of July.

Production in September was, however, quite considerable, and showed an increase over August. According to the steel ingot statistics collected by the American Iron and Steel Institute, and quoted in *Iron Age,* the 30 companies which in 1921 made 87.50% of the total had an output in September of 2,373,779 gross tons, which is 159,197 tons more than the August output.

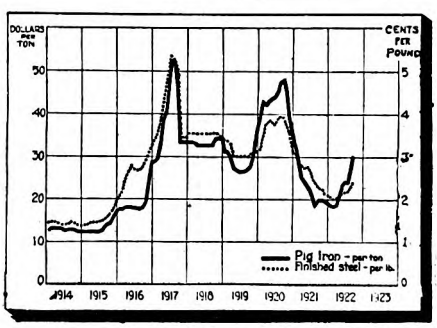
Newspaper reports from Pittsburgh during the past fortnight indicate that the industry is not feeling the car shortage as acutely as formerly. The trade, according to the *New York Tribune,* is beginning to be able to take some tonnage off the ground and start it on the way to customers. Coal supplies are said to have increased in the Pittsburgh and Wheeling districts because of the availability of rivers for transport. This is a considerable improvement over the situation at the beginning of October, when complaints of lack of transportation were universal.

Importance of Iron. Modern electrical developments are attributed to magnetic properties of metal in wrought, cast and steel forms. The great usefulness of alloy steels. JOHN S. UNGER, *Iron Trade Review,* 9-28-22, 2000 w. APS.

Grey Iron Casting, Chemical Analysis. Discussing the carbon problem in cast iron and steel. High sulfur in castings made during war can be reduced by using low sulfur pig iron admixtures or by desulfurization in the electric furnace. Valuable table of recommended analyses for various classes of castings. RICHARD MOLDENKE, *Canadian Foundryman,* 9-22, 3000 w. APS.

Electrolytic Iron. Description of process of producing electrolytic iron from sulphide ores, in which the ore is ground and agitated with spent electrolyte (containing ferric and ferrous chlorides in equal molecular proportions). Sulphur and other insolubles are filtered. Copper that goes into solution is easily precipitated on metallic iron and zinc and cadmium are removed from solution as a sulphide. The diaphragm cell used is much like a caustic soda cell. When conditions are right, 1 gram of iron may be had per ampere-hour. Estimates of costs. F. A. EUSTIS, *Chem. Met. Eng.,* 10-4-22, 1500 w. CJW.

Pure Iron for Welding. Swedish and Norway iron served as welding material before the war. Today American Wire manufacturers produce welding material unexcelled in purity and serviceability. The pure iron produced in the open hearth furnace under special conditions contains aggregate impurities of less than 0.14% and degasification is complete. Detailed discussion of the necessary specifications of welding wire and the effects resulting from a deviation from these specifications. Method of testing welding wire in the field. Diagram showing rod mill steps by which the billet after the last pass of the blooming mill is converted to No. 5 rod by 18 passes. The five essentials of good welding wire are: 1. That it produce a weld approaching the general physical characteristics of the base metal. 2. That it does not contain nor tend to produce gases. 3. That it is free from slag or slag-forming constituents. 4. That it is chemically and physically uniform. 5. That it embodies ease of operation. C. A. MCCUNE, *Raw Material,* 9-22, 19 Figs., 3000 w. APS.



(Federal Reserve Bank, Phila.)
Iron and steel prices, composite price of several grades.

Rustless Iron for Cold-Working. The popularity of stainless steel led to investigation seeking to produce a rustless ductile material for uses for which stainless steel is too hard. Saville rustless iron can be cold worked into intricate shapes with sharp angles and after polishing it possesses and retains rustless properties without hardening or heat-treatment. *Raw Material,* 9-22, 1000 w. APS.

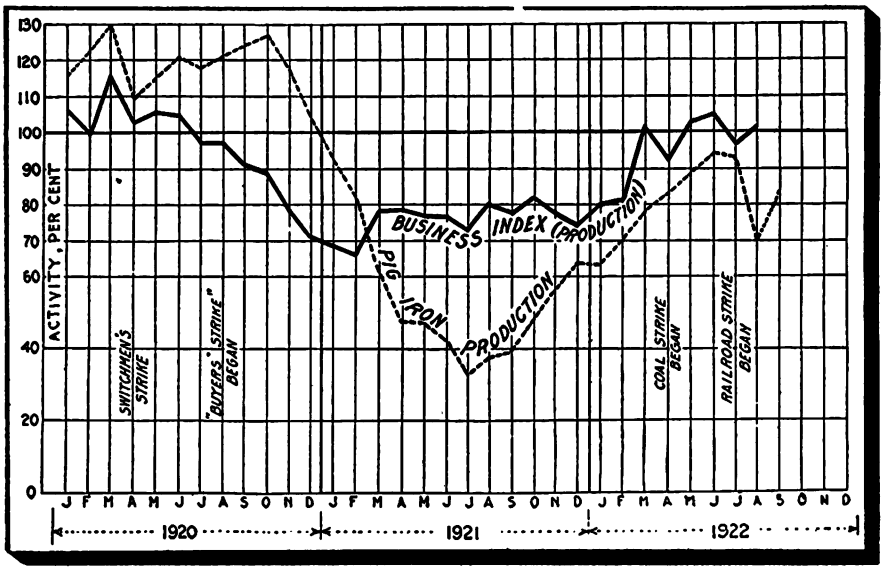
Electrodeposition of Iron. Experiments on the use of the ferrous-calcium chloride solution. Limits of current density for good deposits are wide. Favorable temperature is 90° to 110° C. The deposit is malleable as compared to the usual brittle deposits. Numerous experiments with details as current densities, temperatures, adherence on various bases, acidity of solution, malleability of deposits. W. E. HUGHES, *Brass World,* 9-22, 5000 w. APS.

Iron and Steel Application to the Cement Industry. Discusses use of steel in design of cement plant machinery, emphasizing importance of co-operation between cement engineer or engineer building cement machinery and the steel plant metallurgist. Gives several examples of failures and causes, with suggestions for correction. W. R. SHIMER, *Eng. World,* 8-22, 4500 w. CS.

Arc Welding of Cast Iron. Summary of the art as it exists today, outlining the difficulties that have been encountered and degree of success which has been achieved. Descriptions are given of typical cast iron arc welding operations by various methods. Two fundamental methods: carbon arc and metal arc, the latter being divided into metal arc welding with studs and without studs. Carbon arc process gives better results on heavy work than the metallic arc. Making of dependable cast iron weld is much more difficult with cast iron than with mild steel, because of high percentage of impurities, brittleness and low strength and comparative low melting point. W. H. NAMACK, *J. Am. Welding Soc.,* 9-22, 12,000 w. CJW.

Pouring Sound Ingots of Fine Steel. After metal has been properly made and thoroughly degasified, it is poured relatively cold in order to restrain segregation, columnar and coarse crystallization. Piping is reduced by inverted ingots and by rapid pouring at the end. External cracking, occurring when surface regions are just solidifying, or later when passing through "blue heat," may be guarded against by tapering mold so ingot will free itself and not hang, and by fluting mold. Internal cracks, including flakes, must be restrained by interrupting relatively rapid cooling in mold and replacing it with slower cooling in ashes as soon as ingot has solidified sufficiently to be moved without danger of cracking, by saddening and thereby substituting strong cohesion and toughness for its initial fragility due to its having very coarse crystalline sugar-like structure, by retarding heating of ingots for forging and that of forgings themselves so as to lessen thermal stresses by as great freedom from inclusions as possible. W. P. BARBA and H. M. HOWE, *Chem. Met. Eng.,* 8-23-22, 2250 w. CJW.

Labor Problems in Electric Melting. Discussion on the selection and training of melters. The relationship of metallurgist and chemist. The problem of charging the furnaces may be solved by instituting a bonus system. The electricians and furnacemen. CHARLES WELLMAN FRANCIS, *Iron Age,* 9-21-22, 1500 w. APS.



(The Iron Age)

The solid curve represents productive activity in the United States from the beginning of 1920. This is represented in volume of production—not in value. The figures for each month are expressed as a percentage of the average month of 1919. Pig iron production, also in tons, appears in the dotted curve, which shows how much more heavily the iron and steel industry was hit by the slump of 1921 than was industry in general.

Modern Blast Furnace Practice. American and British methods and design discussed by Iron and Steel Institute (London). Paper by A. K. Reese brought forth keen discussion on the best size of blast furnace, the economy of dry blast, the value of crushing and grading ores, the density of coke, the importance of proper distribution of materials in the furnaces. Paper by C. H. W. Holmes on molding sands. Paper by H. K. Ogilvie on the manufacture of high-speed steel brought forth interesting details on the use of tungsten as powder and ferrotungsten, of turnings. Also brought out the conflicting results produced by Brinnel test and the ordinary file test for hardness. J. H. S. Dickenson read paper on flow of steels at low red heat. The nickel chromium alloy used for ammonia synthesis vessels was of all metals the best able to resist occasional and intermittent heavy loads at high temepartures. *Iron Age,* 9-21-22, 4500 w. APS.

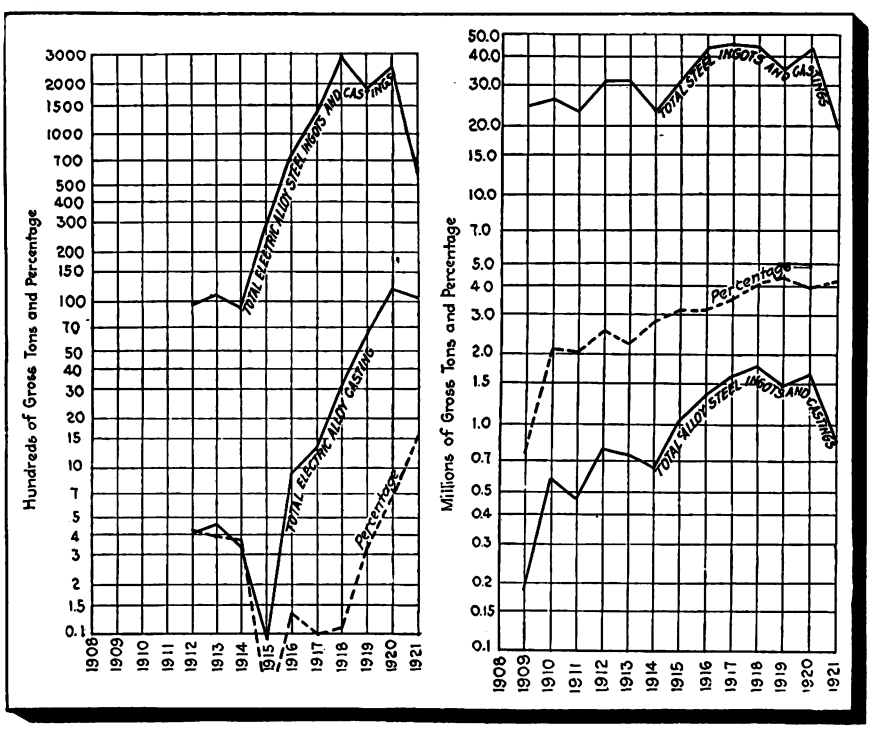
Influence of Mass in Heat Treatment. Role of special elements, nickel, chromium and molybdenum, in counteracting effect of size. Experimental data on sections 0.5 to 3 in. in diameter. E. J. JANITZKY, *Iron Age,* 9-28-22, 1800 w. APS.

Pearlitic and Sorbitic Manganese Steels. Plea for castings containing about 1% manganese. The old upper deadline for manganese due to the old poor results has been exceeded with interesting results, just as the old limits have been exceeded for phosphorus and sulfur without harmful results. JOHN HOWE HALL, *Iron Age,* 9-28-22, 2000 w. APS.

Forge Output Highly Specialized. Description of the gradual specialization of the forge output of a company which entered the forging field because it was left with a steam hammer as a result of a canceled order. Details of plant equipment and operating details. Nine photographs. *Iron Trade Review,* 9-28-22, 4000 w. APS.

Steel Mill Electrification. Mill electrification is progressing, but owing to subnormal condition of the industry only those changes were undertaken which required no considerable financing. Direct motors are being preferred. A new type of variable speed, alternating current motor drive, known as the frequency converter speed set, is being used successfully. Plant thermal efficiency has been increased through better plant layout and attention to detail. Turbines have been considerably improved in detail in the past year. Yard electrification has progressed. Third-rail system is found generally preferable to an overhead contact system. New lighting reflectors have been introduced. Table shows, recent steel mill motor installations. R. B. GERHARDT, *Iron Trade Review,* 9-21-22, 4000 w. APS.

Utilization of Waste Heat in the Steel Industry. The steel plant consisting of blast furnaces, open hearth furnaces, mills, forge and machine shops, power plants and buildings is so arranged that the utilization of heat in any branch can be converted into work useful in the same or another department. The blast furnace gas, formerly considered as a waste product, carries about 60% of the available heat and is now used for stoves, blowing and power units, boilers and miscellaneous heating. Heat balance of a 500-ton blast furnace is given. In the open hearth furnace 18% of the available heat is abstracted for useful work and the remainder is lost as sensible heat of the slag and stack gases and by radiation, etc. The largest item is heat lost in the stack gases. Waste heat boilers are used to recover part of this heat. Gas vs. steam power. Modern steel plants usually have gas-engine installations. Diagrams of typical power plant installation, of heat balance for simple and compound engines and turbines, etc. A. T. LEWIS, *Mechanical Engineering,* 8-22, 1800 w. APS.



(Iron Age)

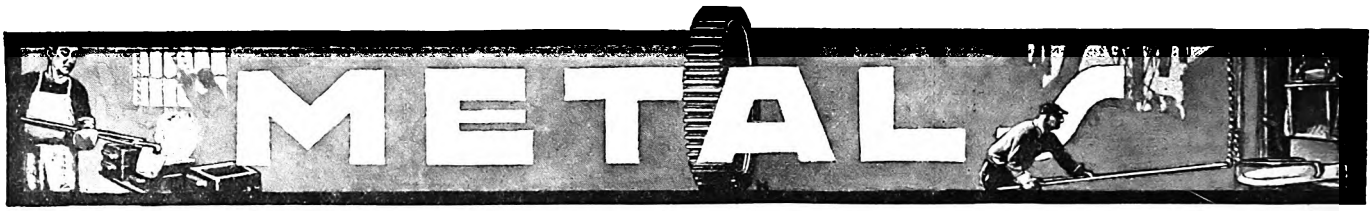
Castings of electric alloy steel have rapidly been increasing in tonnage and in the percentage of all alloy steel made in electric furnaces.

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Copper Industry in Strong Position

STATISTICS for the third quarter of 1922 indicate that the copper industry is in a stronger position than at any time since the war ended, according to *Steel and Metal Digest.* Since the beginning of the year sales of the red metal, refined, have averaged 133,000,000 pounds a month. The sales in September were close to 120,000,000 pounds, and the output was 130,000,000 pounds. The surplus stocks in the hands of producers have been greatly reduced, total stocks at the end of September being about 270,000,000 pounds, of which nearly 160,000,000 pounds are credited to the Copper Export Association, leaving only 110,000,000 pounds available for domestic consumption.

The position of the producers is further strengthened, the magazine says, by the fact that no important surplus stocks of brass or copper scrap now exist in the United States or Great Britain. France is the only country which is said to have a considerable surplus of old material.

In the opinion of *Verde Copper News,* quoted in the *Arizona Mining Journal,* the best possible evidence of the growth in the demand is the fact that although production has increased during the past six months the price remains steady. An early increase in price is expected.

Another favorable indication is the fact that the producers are taking an interest in the sale of finished products, whereas in the past they concerned themselves solely with the sale of the raw material. They are now issuing propaganda pointing out the advantages of copper over other metals for specific purposes, and educating the public in its use.

Aluminum Alloys. Useful foundry alloys contain relatively low percentages of copper, zinc, or both. Of the aluminum-copper series, those important contain less than 15% of copper or less than 11% of aluminum. Alloy with 7% to 8.5% copper is tough, has tensile strength of from 15,000 to 20,000 lb. per square inch, casts well and gives little trouble from checking and drawing of the casting. Aluminum bronzes contain about 10% aluminum, have high tensile strength, do not corrode readily, and have great resistance to alternating stresses. For forging, few metals excel alloy containing 10% to 15% zinc. Aluminized zinc contains from 5% to 10% aluminum, and is used in zinc-galvanizing baths and in manufacture of aluminum brass. Manganese influences aluminum in same way as copper. Magnesium alloys are harder, stronger and lighter than pure aluminum. Other alloys are less useful. Physical properties given. ALUMINUM COMPANY OF AMERICA, *Chem. Met. Eng.,* 9-6-22, 2500 w. CJW.

Electroplated Zinc. Experiments made to determine the cause of the disappearance of certain metals that had been deposited on zinc indicate that copper, brass, gold and silver are diffused into zinc, whereas nickel, which does not diffuse into zinc, can be used as a preventive against diffusion of other metals deposited over it. W. G. TRAUB, *Trans. Am. Electrochem. Soc.,* 8-25-22, 750 w. CJW.

Circulation of Molten Metal. Three important electrodynamic forces that may be used to circulate molten metal: pinch effect; corner effect; motor effect. Pinch effect is action of current upon its conductor. Corner effect is action of current upon conductor in another part of same circuit. Motor effect is action of current in one circuit upon current carrying conductor of another circuit. Of interest to electric furnace operators. O. BROPHY, *Met. Eng.,* 9-6-22, 750 w. CJW.

Electrolytic Zinc Practice. Résumé Fundamental principles are simple, but impurities are particularly troublesome, and details must not be overlooked. Farthest advanced commercially of the wet processes for metals are those for copper and zinc. Process is attractive for complex ores if power costs are reasonable. Involves four principal operations: roasting, leaching and purification of solution, electrolyzing and melting of cathodes. Process is likely to be the foundation of electrolytic processes for recovery of metals associated with zinc. J. T. ELLSWORTH, *Eng. Min. J.-Press,* 9-2-22, 2000 w. CJW.

Ferro-Alloys. Function of ferro-alloys in manufacture of steel is twofold: deoxidizing and cleansing (ferro-silicon and ferro-manganese) and imparting necessary and desirable physical properties. Main metallurgical developments have been in connection with those alloys that form true alloy steels and persist as constituent of finished metal, such as ferro-chrome, ferro-tungsten, ferro-vanadium and ferro-molybdenum. Discussion of role of electric furnace in their production. B. D. SAKLATWALLA, *J. Ind. Eng. Chem.,* 9-22, 2000 w. CJW.

Ferrymetal is a new alloy of lead, calcium, barium and small amounts of other constituents. The alloy is practically unoxidizable.—*Dearborn Independent.*

Vanadium. Technical chemistry really dates from 1900, when it was introduced into metallurgy. The metal possesses a reaction capability enabling it to form an extensive number of different compounds. Main industrial processes for treatment consist of wet leaching processes and dry smelting operations. Former practically obsolete because of losses connected with it. Most difficult part of extraction is final reduction to metallic state. Brief discussion of metallurgy. Exploitation of vanadium in non-ferrous industry is comparatively in its infancy and furnishes fertile field for metallurgical research. Possibilities outlined. R. B. SAKLATWALLA, *J. Ind. Eng. Chem.,* 10-22, 2500 w. CJW.

Tantalum. Metallic tantalum is now available. No tonnage uses can ever be expected because of its manufacture in vacuum. Resistance to wet corrosion is its most obvious characteristic. Has some interesting electrical properties, most novel of which is its valve action in electrolytic cells. It combines with gases at elevated temperatures to form stable compounds which are not readily dissociated into the gas and pure metal below the melting point, 2850° C. *Chem. Met. Eng.,* 10-4-22, 500 w. CJW.

Reduction of Hematite. Experiments on reduction of hematite to magnetite by methane, using mixture of 40% hydrogen and 60% methane and with gas in contact with hematite for half minute, showed that at 600° 4% of the methane is oxidized; at 700° 30%; at 800° 55%; and at 900° 90%. The hydrogen is almost entirely consumed except at the lowest temperature, when about 5% is left. It appears then that methane should be used at temperatures above 900° to secure satisfactory rate of reduction. Theoretical application of results given. C. M. BOUTON, Bureau of Mines, Reports of Investigations, No. 2381, 8-22. CJW.

Monel Metal for Valves. Monel metal is eminently suited for high temperature conditions. Gas engine valves of the usual type, Diesel engine valves. *Raw Material,* 9-22, 500 w. APS.

Art of Alloying. Part 2 of an abstract from *Beitschrift f. Metallkunde,* June, 1921. The alloy chart has the initial elements along one axis and the added elements along the other axis. Various regions by their markings indicate useless alloys, alloys impossible of attainment and alloys of limited value. The unmarked areas indicate useful alloys, whose specific valuable properties are noted. *Brass World,* 9-22, 1800 w. APS.

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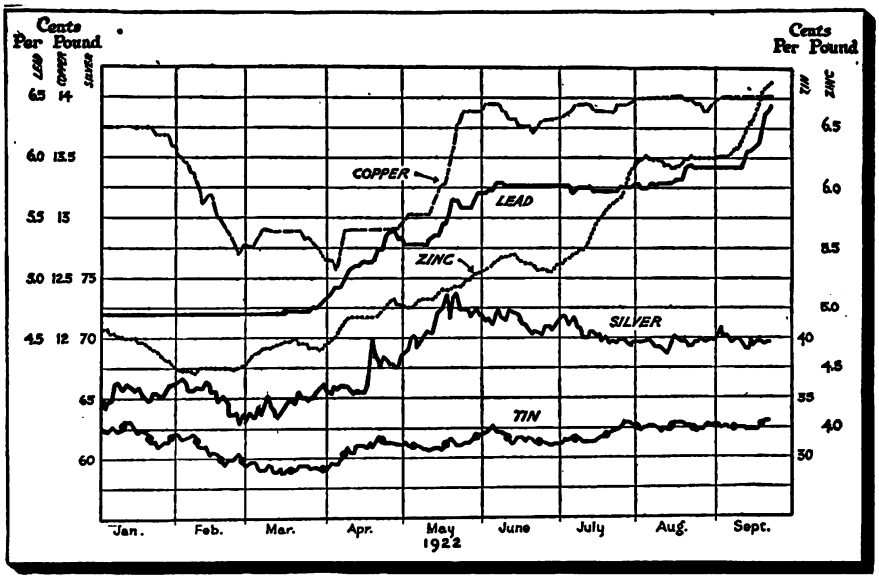
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Magnesium Alloys. General review. Tables give comparative physical properties of cast alloys and Dowmetal alloys. Most recent advance is production of new Dowmetal piston alloys in which toughness and fatigue endurance have been very materially increased without any sacrifice whatsoever in other desirable properties. Great possibilities are indicated in future development and use of magnesium alloys. J. A. GANN, *J. Ind. Eng. Chem.*, 9-22, 1200 w. CJW.

Mixed Sulfide-Oxide Ores of Copper. Review of use of sulfuric acid and sulfur dioxide as solvents. Ammonia is used at Calumet and Hecla and at the Kennecott; at both places ore is so high in calcite that an acid could not be used. Mechanical difficulties prevent its application to agitation leaching of finely ground ores. Most extensive leaching operations of world are being carried on with iron salts. Twenty other solvents have been tested. After copper is in solution, must face equally difficult and expensive operation of getting it out again. Oldest method is precipitation with iron. Electrolysis has been used successfully. Question of iron dissolved from ore important. First cost of plant is difficult to determine. Sulfur dioxide may be used, cost of plant and operation being about same as for electrolytic plant. Hydrogen sulfide might be used, either with clear solution or in a pulp. In Neill sulfur dioxide process, heat alone is used. Not able to make choice between methods at present. H. W. MORSE, *Mining Metallurgy*, 9-22, 4000 w. CJW.

Aluminium Alloys. Sand most generally used in aluminium founding is Albany OO molding sand. Aluminium alloys are light and brittle or "hot short" at temperatures slightly below the melting point. Sand should be rammed lightly and mold should be well vented. Liberal fillet should always be employed where gate connects with casting in order to avoid drawing just beneath that point. By increasing height of riser pressure of metal may be increased and sounder and sharper castings will result. Chills may also be employed as safeguard against injurious shrinkages, especially in large castings of irregular sections. Cores should be made as soft as is consistent with safe manipulation. Good core consists of mixture of sharp and moulding sands in varying proportions, held together by binder as rosin, flour or core oil. Aluminium die castings are of comparatively recent development. Test bars discussed. *Aluminium Company of America, Chem. Met. Eng.*, 9-13-22, 2000 w. CJW.

Aluminum-Silicon Alloys. Two classes, normal, made by melting silicon and aluminum and casting in sand, and modified, made by being given a special treatment in molten state immediately before casting. These alloys flow readily, may be cast in very thin sections without cracking and are quite free from shrinks and the porosity which is not uncommon in some other aluminum alloys, so that they are water-tight. In general, a somewhat higher silicon content can be used in the modified alloy than in the normal one. Values are given for density, expansivity, tensile strength and elongation, electrical conductivity, thermal conductivity, resistance to corrosion; machining qualities are not quite as good as for No. 12 alloy. Process of modification consists in adding to the alloys a very small percentage of sodium. The sodium burns and after the process is complete, the metal is skimmed. The actual modification results from the modified mechanism of solidification in the presence of the sodium. J. D. EDWARDS, *Chem. Met. Eng.*, 9-27-22, 1500 w. CJW.



(*New York Evening Post*)

Non-ferrous metal prices go higher. Since last April there has been a marked advance in copper, lead, and zinc, although the movements in the case of these metals show considerable variation. The curve for silver represents the price of the foreign metal, as under the Pittman act the price of the domestic product is at present stabilized at $1 an ounce. The quotations for all the metals represented in the chart, except zinc, are those of the New York market. For zinc the prices are those of the St. Louis market.

Modillion Cornices. Second of series of three articles on developing the patterns, construction and erection work. Gives detail of computations in design work. *S. P. Sheet Metal Worker*, 9-29-22, figures, 1500 w. APS.

Etching Reagents. Discussion of reagents for copper alloys, nickel and the alpha alloys of nickel. Results are given to show importance of films varying in thickness upon different crystals in metallographic specimen in producing a "contrast etch pattern." This is clearly shown by separating filming and etching operation, both sulfide and oxide films being used. The alpha copper alloys resemble copper in their general behavior upon etching. Aluminum bronze was found to be most unsatisfactory of such alloys of copper to etch. Nickel is etched with considerable difficulty. Strong oxidizng acids, such as nitric, or other acids to which oxidizing agents have been added may be used, but there is usually considerable pitting of surface and very noticeable lack of contrast in resulting etch patterns. Concentrated hydrochloric acid, however, is excellent in both these respects. Monel nickel and cupro-nickel resemble nickel in their etching characteristics, though they are etched more readily. Nickel brasses are much more like the brasses and bronzes and are readily etched by reagents used for these alloys. Copper alloys, like copper, are readily etched by ammoniacal, acid, and some neutral solutions, which otherwise would have only slight effect upon them, provided a stream of oxygen is passed through solution while specimen is immersed. Nickel, cupro-nickel and monel metal are not materially affected in the rate of etching by use of oxygen. H. S. RAWDON and M. G. LORENTZ, Bureau of Standards, Scientific Paper No. 435 (1922), 40 pp. 15 cents. CJW.

Thermit Welding. Thermit welding is used extensively for reducing maintenance costs in street railway shops in making up special work, welding arms to broken mates, welding compromise joints when needed and for repairing car truck frames, electric motor cases, etc. J. H. DEPPELER, *J. Am. Welding Soc.*, 9-22, 1500 w. CJW.

Gas Absorption and Oxidation Non-Ferrous Metals. Cause of gassing molten metal is furnace atmosphere. Gassed metal is brought back to normal by remelting in an oxidizing atmosphere. A reducing atmosphere is more troublesome than an oxidizing atmosphere. Defects caused by gas or shrinkage may have an appearance similar to those caused by oxidation and are often mistaken for such. B. WOYSKI and JOHN W. BOECK, *Brass World*, 9-22, 3000 w. APS.

Pyritic Smelting in the Caucasus. Description of apparatus used at the Siemens-Kwarzchana copper works, the ore running from 4.5% to 7.1% copper, 42% to 44% sulfur, 34% to 37% iron, 2.8% to 3.6% zinc, 3% to 3.5% silica. The sintering pots are of boiler sheet iron with a ribbed cast-iron lining, but they are not satisfactory, and it is planned to return to cast-iron pots. Normal charge for the blast furnace, which is described, consists of ore, 125; sinter, 45; quartz, 20 to 24. With the lower copper ores: ore, 125; sinter, 36; quartz, 20-24; coke, 4; slag, 14. Trial to replace coke by so-called anthracite from Thwibul was not successful. Description of converter and its operation. C. OFFERHAUS, *Eng. Mining J.-Press*, 9-30-22, 4000 w. CJW.



Car Shortage Hits Lumber Trade

THE lack of railroad cars is seriously hindering the shipment of lumber. According to the *American Lumberman,* the shortage is the single controlling factor in lumber supply. This magazine thinks that there is little prospect of immediate relief. "There is ample reason," it adds, "to believe that the shortage will grow worse instead of better. The most confirmed pessimist can find abundant facts to support his most gloomy predictions."

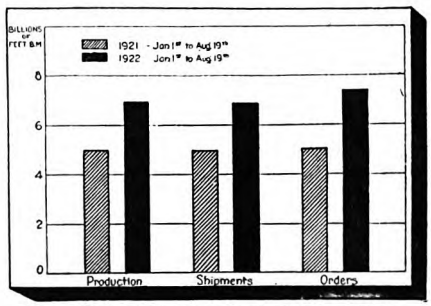
Consumer demand, the magazine says, is everything that the lumberman could wish for. The building trade is calling loudly for wood, the railroads are in the market and even the farm trade is no longer indifferent. Yet the offering and acceptance of orders shows a falling off, because the lack of transportation makes delivery uncertain.

The Southern Pine Association has sent its members a questionnaire to ascertain the extent to which the railroads supplied their demands during the first half of September. Replies from 58 mills showed that 8700 cars were ordered and only 2612 received. Since that time conditions have grown considerably worse.

Redwood. Redwood is one of most rapid growing of all conifers. Lumber from young stands is inferior to virgin timber, but this is shared by other species. Hickory is about only one that does not show this characteristic. Redwood also has property of sprouting from the stump and root suckers spring up considerable distances from parent tree. As result redwood is easy to reproduce and difficult to eradicate. Movement toward policy of sustained yield. While difficult to burn, fires leave their mark in scarred trunks, which furnish points of entrance for rot. Modern logging methods leave few seed trees. This practice should be corrected. Possible to raise redwood from seeds in nursery, but this has its drawbacks. Cost of planting cutover lands. DONALD BRUCE, *American Lumberman,* 9-9-22, 2000 w. CJW.

Mahogany. "True" mahogany grows in southern Florida, the West Indies, southern Mexico and Central America. Other species often sold as substitute because of close resemblance. Sixty different species, but only five recognized botanically. Botanical features. Bulletin No. 1050 of Department of Agriculture gives directions for recognizing the true product. Production and consumption figures. Uses include: furniture and fixtures, 47%; musical instruments, 17%; millwork, 14%; car construction, 12%; caskets and coffins, 3%; ship and boat building, 2%; vehicles, 1%; other uses, 4%. Figures for 1914 imports. Prices. Manufacture of veneers. *Lumber and Veneer Consumer,* 8-30-22, 2000 w. CJW.

Grade Marking of Lumber. This will tend not only toward economical distribution, but is big step toward better merchandizing. Defined as process of stamping or branding piece of lumber with symbol indicating quality or grade. Also contains symbol representing name of producer or seller, degree of manufacture of material (rough or planed) and species of wood in question. Nearly every important lumber-producing country in world has adopted grade marking system. In Northern Europe lumber not so marked is looked upon with suspicion. Costs from 6 to 15 cents per 1000 ft. Advocates in this country as safeguard against tampering with grades. Practiced chiefly in U. S. in hardwood lumber and then mostly for export trade. AXEL H. OXHOLM, *Packages,* 8-22, 800 w. CJW.



(Federal Reserve Bank, Philadelphia)

Revival of lumber demand for building purposes is shown in the large increase as compared with last year. Present excess of orders over production and shipments is significant.

Wood Substitute. Magnesite composition is new substitute for wood. Served for practically all parts of house. Rock deposits are ground and reduced to crude calcined magnesia. This is then ground to fine powder and mixed with aggregate (fine or coarse) and magnesium chloride added in sufficient quantity so that a mixture about the consistency of plaster is obtained. This moist composition is applied with trowel to foundation which has had its suface roughened or covered with mesh chicken wire on regular metal lath. Surface not as hard on feet as cement or tile, and being impervious to water, is more permanent than wood. Greatest triumph as stair material. Also used extensively in unfired tile, which can be made in any size, pattern, color, shape or design. P. BINGHAM, *Science and Invention,* 9-22, 600 w. CJW.

Plastic wood is a collodion preparation made with very fine wood meal and of the consistency of putty. It is claimed to be waterproof, will set hard and can be turned with a lathe. Nails can be driven into the dried material without cracking it.—*Dearborn Independent.*

Drying Schedules. Eleven kiln drying schedules, which cover practically entire range of hardwood and softwood lumber drying, have been prepared. Based on moisture content of stocks in kiln, which is safest basis and one which assures most uniform results. Also are lists of hardwood and softwood species with index of schedules to be used in drying them. When it is necessary to dry at one time in kiln 2 or more kinds of lumber requiring different drying schedules, mildest of schedules required should be followed. Forest Products Lab., Technical Note 175, 6 pp., 8-1-22. CJW.

Dry Rot. Decay in timber is attributable to many causes—sap, bad selection, insufficient or improper natural or artificial seasoning, wetness and the reverse by turns, and an entire absence of, or inadequate ventilation, or ventilation with unsuitable air. Gives cause and avoidance, with treatment and cure. *Canadian Motor Boat,* 9-22, 1000 w. CS.

Ideal Shipping Container. Analysis of construction of containers. Characteristics of box material to be considered are ability to absorb shock, resistance to splitting and tensile strength. Must then have proper utilization of this material so as best to take advantage of its properties. Superior strength is obtained by using pieces as wide as possible and preferably of full width of box side and still greater strength is obtained when four sides are made of one continuous piece appropriately bent at corners. Such materials are either of fibrous texture or laminated as plywood. When plywood is made two ply it can be bent commercially as low cost so that it can be formed into a shell having only one joint. Tests of Celotex (bagasse fibrous board) also described. Diagrams illustrating forces acting on boxes given. A. ELMENDORF and J. R. WATKINS, *Fibre Containers,* 9-22, 1600 w. CJW.

Very dense charcoal, needed for gas masks, was formerly made from peach pits and cocoanut shells. It can now be made from soft wood charcoal by using proper pressure.—*Steam Shovel and Dredge Mag.*

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And since the average business man can scarcely afford to pay for the reading secretary and the staff of experts which this would require—we feel that THE INDUSTRIAL DIGEST has accomplished a very real service for the American business man in doing exactly this thing.

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This report is constructed with a view to absolute simplicity and uniformity. That is to say, it is organized into different sections so that each reader may know every fortnight where to find the information which is most valuable to him. It is simplified because there is absolutely no extraneous matter. Everything that appears in this fortnightly report is worth reading—and everything in the report of interest to any executive can be read in two hours.

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Do we need to emphasize the comparison?



Waterpower

WATERPOWER continues to hold an important place in the public mind. Congress has just renewed the lease of the Alabama Power Company on the steam power plant at Muscle Shoals, but has failed to take any action that might lead to the development of the project and the salvaging of the Government's investment. The Federated American Engineering Societies have decided to make an impartial investigation of the Shoals situation—a decision which, in the opinion of *Chemical and Metallurgical Engineering,* "will meet with the approval of all who sincerely want to get a fair appraisal of the relative value of the several plans that have been proposed."

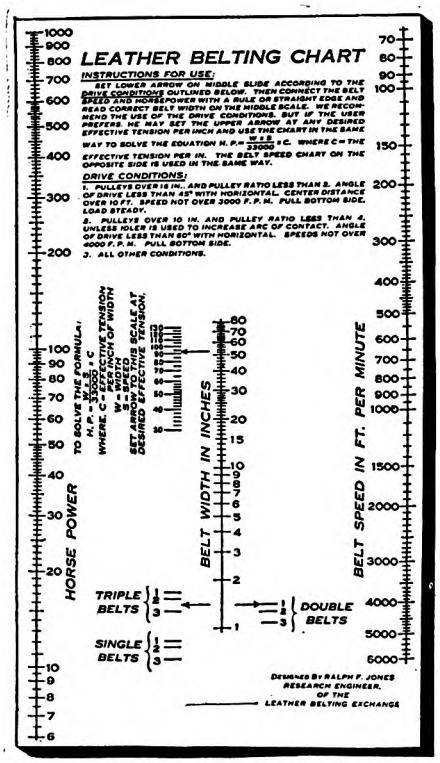
In New York State waterpower development is an issue in the Gubernatorial campaign. The Democratic party, according to *Power,* is committed to the development of all waterpower by the State itself, and the Republicans advocate private development by license, under State supervision and regulation. The State Water Commission has just issued a report on the waterpower and storage possibilities of the Hudson valley, recommending that developments be made that will save 2,000,000 tons of coal yearly. The commission says that 222,000 additional horsepower could be developed on the upper Hudson River and on the Sacandaga, a tributary, and recommends that 14 storage reservoirs be built at a cost of $24,292,000 in order to salvage this power. The attitude of the political parties toward this plan is not yet clear, but it may develop during the campaign.

CO_2—Record of Combustion Efficiency. The CO_2 indicator before fireman guides him in attending to his fires and in making proper adjustments so as to secure high combustion efficiency continuously, just as steam gauge shows him whether he is maintaining desired steam pressure. To insure maximum boiler efficiency fuel must be burned with minimum excess air compatible with complete combustion. High initial or furnace temperature is important in boiler practice both as regards efficiency and boiler capacity. Low CO_2 means dilution of hot gases with unnecessary cold air and greatly reduced furnace temperature. Next step is to give gases ample time to impart their heat to heating surfaces of boiler. Here again minimum volumes of gases (high CO_2) is of advantage. Losses up chimney increase at an accelerating rate as percentage of CO_2 decreases. C. C. PHELPS, *Paper Trade J.*, 9-21-22, 1200 w. CJW.

Keeping Power House Performance Logs. This is most important for comparison and reference. The article gives the necessary information as to how to keep these logs correctly and illustrates the form of log to be used. R. JUNE, *Power House,* 8-20-22. IG.

Boiler House of a Large Sugar Refinery. General features of the boiler house of the American Sugar Refining Co. at Baltimore are described. Details of the feed water system, combustion equipment, instruments, etc., are given. E. B. POWELL, *Power House,* 8-20-22. IG.

Compressed Air Systems. Loss in energy and pressure due to leaks is likely to be heavy unless pains are taken to keep leakage at minimum. Saving in maintenance and operating power will be obtained by keeping pipes off the bottom of the mine. Continuous operation of entire system for one or two pumps or one section greatly increases losses. Another large source of loss is use of compressed air to ventilate chambers. Large economies which should result from electrification of air-actuated equipment do not materialize because of leakage and valve cracking. Another common practice in the utilization of steam-driven compressors which is highly wasteful is to regulate their operation by hand. J. A. MAGUIRE, *Coal Age,* 9-28-22, 1500 w. CJW.



(Belting, Transmission, Tools & Supplies)

New horsepower scale for leather belting. Instructions for use: Set lower arrow on middle slide according to drive conditions outlined below. Then connect belt speed and horsepower with rule or straight edge and read correct belt width on middle scale. We recommend use of drive conditions, but if user prefers, he may set upper arrow at any desired effective tension per inch and use chart in the same way to solve the equation $H.P. = \frac{W \times S}{33000} \times C$. *Where C = the effective tension per in., the belt speed chart on opposite side is used in same way.*

Steam Turbine Lubrication. Little is known of operation of geared units. Lubrication of bearings is subordinated to lubrication of gears. Real function of lubricant is gear tooth protection. Some gears are lubricated by splash system. Correct level is obtained when it reaches point equal to level of inside of rim when gear is at rest. Direct-connected turbines served with pressure circulating system may be divided into those of 2500 kw. or less, served by oil system for lubrication of bearings only, and larger-sized machines where oiling system may be part of governor control or where larger volumes of oil are used in system supplied. Lubricant is subjected to very severe service. In smaller units increased reservoir capacity and increased cooling capacity of system would considerably modify strenuous operating conditions. Lighter bodied oil would better withstand severe treatment of high temperature, oxidation and water contamination. Thrust bearings are designed with large factor of safety as to unit bearing pressures and do not require any special consideration as to kind of lubricant to use. T. A. BROWN, *Power Plant Eng.,* 9-15-22, 1600 w. CJW.

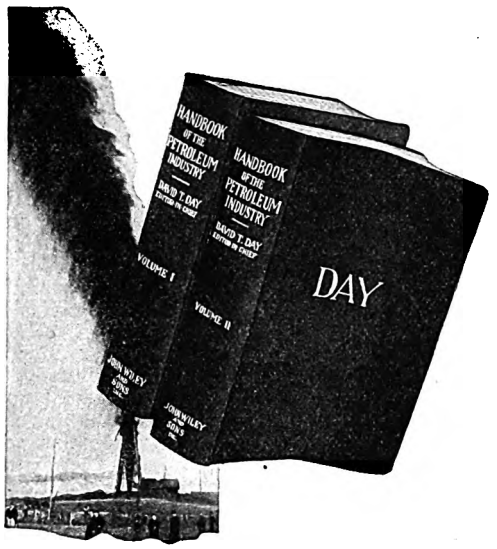
Regeneratively Fired Heating Furnaces. Translation of section from "The Flow of Gases in Furnaces." Conditions necessary for freeing the hearth of waste gases. An armor-plate heading furnace of the Krupp type (in Russia) was so defectively designed that the plate was in a pocket of cold gas. W. E. GROUME-GRJMAILO, *Iron Age,* 8-31-22, 1500 w. APS.

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MACHINERY

Railroads Buying Tools

HEAVIER buying by the railroads featured the machine tool and equipment market during September, according to *Iron Trade Review*. With the settlement of the rail strike virtually all of the major roads of the country entered the market. Large industrial buying, which was expected, did not materialize, the magazine says. Dealers and manufacturers, it adds, are puzzled at the reluctance to purchase on the part of machinery users, in view of the fact that machine tool prices show a tendency to rise.

Machinery views the situation from a different angle. This magazine believes that buyers of shop equipment have decided that there is no reason for holding back any longer, and it attributes the recent increase in activity in the market to other than railroad buying.

"Conditions in the machine tool industry vary considerably according to the types and sizes of machine tools built," the magazine adds. "We find shops—especially those whose product directly or indirectly serves the automobile industry—working full time and even employing night forces. One manufacturer of heavy machine tools finds the improvement so marked and steady that normal business in his line of machinery is expected early in 1923. Another manufacturer of a standard line of high-grade machine tools states that the amount of business for 1922 will equal that of 1915, and in several other instances the pre-war level of production has been reached, with a steady improvement reported. On the other hand, we find shops where the improvement up to the present time has been very slight, and prospects as yet do not promise any large amount of business for some time to come; but fewer machine tool builders now say that there is no business at all than at any time during the last eighteen months. The resumption of work in the machine tool shops is retarded in some instances, not by lack of orders, but by the large stocks still on hand of certain types of machines. However, these stocks have been gradually reduced, as have also those in the dealers' hands, and when conditions today are compared with those of a year ago, optimism should be the keynote."

Effect of Design on Drilling Machine Efficiency. The author points out how the design of the drill influences the character of the work done on it. He takes up the topics of diminishing the amount of sliding friction in machine parts, the direct application of motive power, the cutting section of drills is analyzed; then the factors affecting the efficiency are considered. F. E. JOHNSON, *Machinery*, 8-22, 4550 w. MAH.

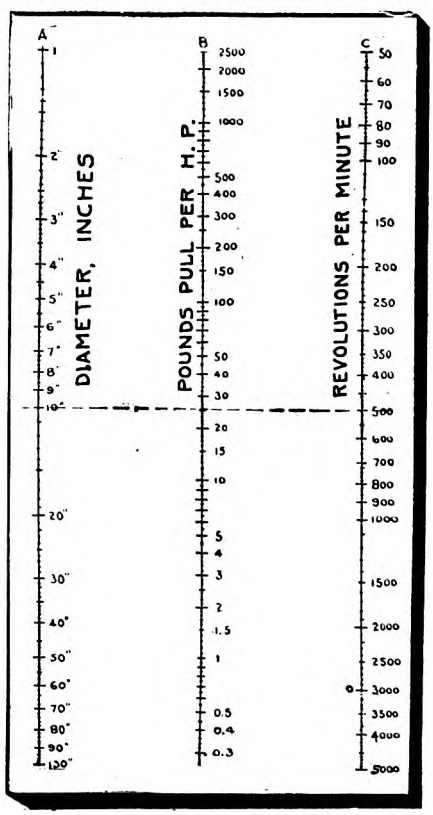
Methods of Machine Tool Design. In this excerpt from the forthcoming book on this general subject, author presents the beginning of gear drives. In it he takes up arrangements of drive and feed gears on lathes, milling machines, boring mills and drilling machines, and others. A. L. DELEEUW, *American Machinist*, 7-20-22, 3200 w. MAH.

Machining and Assembling Pneumatic Tools. The title describes the article adequately. It covers the work done in the machineshop on air hammers and other pneumatic tools, and then their subsequent assembling, dealing specifically with the shops of the Independent Pneumatic Tool Co., Aurora, Ill. HOWARD CAMPBELL, *American Machinist*, 7-13-22, 1400 w. MAH.

Tool Engineering for Turret Lathes. This instalment of a series takes up the design of tools and fixtures for vertical turret lathes and boring mills, including machining spherical and formed surfaces, laying out and developing the design of the tools, holding large pieces, machining piston pots, etc. A. A. DOWD and F. W. CURTIS, *American Machinist*, 7-20-22, 3300 w. MAH.

Standard Tapers. A presentation of the case for existing standards for tapers, the suitability of certain tapers for specific jobs, the advantages which would be derived from a lesser number of standards, and preferably but two, the objections to the Jarno taper. Attitude of British engineers, difficulties of changing now, other closely related topics. L. D. BURLINGHAME, *American Machinist*, 7-27-22, 4300 w. MAH.

Grinding Wheel Breakage and Its Causes. The breakage of grinding wheels in operation is both costly and dangerous, so any thoughtful inquiry into the how and why of such breakage is of value. Author takes up first the primary causes. He lists 11, and then discusses each. Some of the more important ones are illustrated as well.



(Canadian Machinery)
Chart for determining the strength of chains.

HAROLD E. JENKS, *American Machinist*, 7-20-22, 2650 w. MAH.

Power Drills. Comprehensive study of drills, of which the hand drills or augurs and force post drills are rapidly passing out of service. Pneumatic or compressed air drill and electric drills are used, though the latter, due to flexibility of its lines for power, is rapidly forging its way to front as coal mine drill. Detailed discussion of compressed air drill, pick hammer drill, Sullivan rock drills, pneumelectric rock drill, diamond drill, etc. Original should be consulted for mass of details. R. Z. VIRGIN, *Coal Trade Bull.*, 9-1-22, 6000 w. CJW.

Metal Spinning and Spinning Tools. The title gives a good idea of the article and its scope. The process of spinning and the machines used are outlined first, then some special cases are taken up in detail. The author describes an outfit for removing wrinkles from steel shells, the spinning of aluminum shells, inside spinning, bulging the open end of a shell, hot offset spinning, supporting the spinning form by bailstock spindle, etc. EDWARD HELLER, *Machinery*, 8-22, 4000 w. MAH.

Wire Forming. The possibilities of wire forming are not limited by any special sectional shape, by any particular material or by any physical condition of the wire except hardness. Wire may be of and usually is, iron, steel, copper, brass, bronze and precious metals as silver, gold, platinum, etc. This article, the first of two on the subject, takes up the machines which are used in wire forming and describes them thoroughly. In addition, it describes a large number of the parts which are made in these machines, and in the case of a special few parts, describes the various forming operations in considerable detail and from a machineshop executive's standpoint. *Machinery*, 8-22, 3500 w. MAH.

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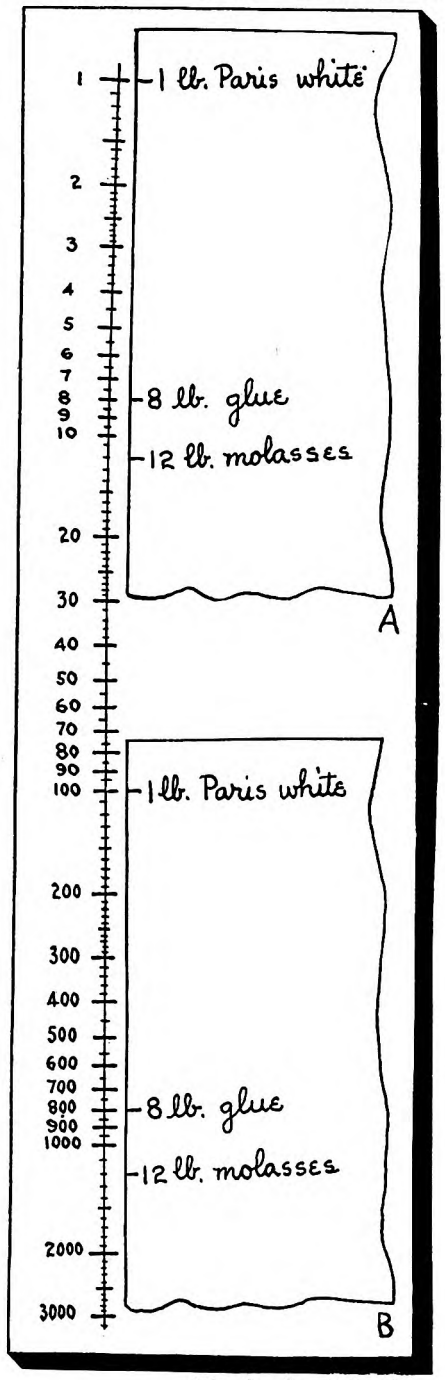
Cutting Newsprint Consumption

NEWSPAPERS have been bigger this year than ever before, and the consumption of newsprint is 13% greater than in 1920, the latest year in which business conditions were normal.

The Wall Street Journal, quoting the Newsprint Service Bureau, says that Sunday editions on an average in August were running more pages than in 1920. Weekday editions were three pages ahead of both 1921 and 1920. This expansion is attributed to the keen competition for circulation, which led publishers to include additional news and features. It is also due, of course, to increased advertising business.

Many publishers are holding down consumption by cutting the amount of news and features printed. According to *Editor and Publisher,* the proportion of advertising to editorial matter in the New York newspapers has increased.

The Fourth Estate thinks that prospects of a solution of the paper problem would be brighter if the publishers would try to get more out of the newsprint they now use by increasing their advertising rates. This magazine quotes Gordon H. Crilley, advertising manager of Wanamaker's Philadelphia store, as agreeing that mediocre advertising should be eliminated from the papers by a 100% increase in rates. At the same time, Mr. Crilly says, the value of the newspapers to the reader should be increased proportionately. "Nothing unreasonable about that," rejoins *The Fourth Estate,* "and if advertising rates were doubled that alone would go a long way toward augmenting the newspaper's value to the reader." The magazine proposes a 50% increase as a starter.



(The American Printer)

A proportioning scale that will be found useful for multiplying or dividing any formula by printers' ink makers, mixers, etc., who must frequently use formulas or recipes in making mixtures or combinations of any kind. To use the scale or chart, simply lay a slip of paper alongside it in position A, as indicated, and then on the slip write out the formula just as has been done here. For example, 1 lb. paris white, 8 lb. glue, 12 lb. molasses.

Printing on Wood. Leading specialties are cigar boxes and shipping cases. Printing is frequently done on all four sides of cigar box, which means that each piece is handled separately. May be printed in large sheets and cut to size. This wood can be printed on strongly built platen press without cutting down platen of press in any way, though platen must be lowered. Done from iron or brass type or plates and hard rubber "stamps" mounted on wood bases. Directions for printing boards ¼ to ½ in. thick. In many instances hard rubber dies will give more satisfactory results than iron or brass plates. May be printed in 2 or more colors on special platen press from rubber dies, brass or iron plates. Same careful attention must be given to quality of ink and rollers as for printing on paper. Other articles printed are coat hangers, thermometer backs, advertising signs, for rent and for sale, measuring rules, toys, game boards, etc. Should not be handled as side issue, but should be specialized in. ROBERT F. SALADE, *Inland Printer,* 9-22, 1500 w. CJW.

Plant Newspapers. Primary purpose is to foster spirit of good-will and cooperation between employees and management. First essential is that paper be read by all workers in plant. Must first determine definite plant policy. All material should bear positive and clearly understood relationship to that policy. Must have attractive appearance. Cover important. Good quality of paper must be used. Plentiful scattering of pictures and drawings all through printed pages. Cartoons are of considerable value in holding interest and attention, but too many should not be used. News in photo form. Everybody interested in news. Few sermons which cannot be preached as news story. All articles should be short and to the point. Variety in make-up necessary. Give advantage to shop worker instead of salaried officials. ERNEST AUGUSTUS, *Paper Trade J.,* 8-31-22, 2000 w. CJW.

Ink Problems in Pressroom. Ideal printing plate is one with color contrasts so that just enough ink to cover plate need be carried. If too much ink is carried, impression will not clean plate and ink will be blamed. Rollers are cause of many ink troubles. Good roller must have plenty of life and be fairly soft and it must be set right. Ratio of speed of form roller is same as that of forms. Temperature plays important part. Often ink is not adapted to paper. Same ink will not work on all kinds of stock. Too many colors. Ink manufacturer is to blame in many cases for trouble in pressroom because he is trying to supply too cheap an ink. Printer must be educated to realize that he is saving money by paying more for ink with greater tinctorial strength. Must also buy better rollers. Cost of ink is only about 3% of total cost of job, so let's use good ink. CLAUDE M. EARLEY, *Inland Printer,* 9-22, 1200 w. CJW.

Employees' Magazines. One of practical ways in which goodwill is being developed and maintained in many concerns is through employees' magazine. Must have an object, which must be lived up to. Best developed by joint conference of employees and one or more representatives of management. Local conditions will determine nature of publication and its administration. Serves as exchange of constructive suggestions for improving business, expression of company aims and achievement as well as achievements of employees, for getting employees better acquainted with each other and with company, for recording important events of interest to all concerned in company, etc. DANIEL BLOOMFIELD, *Mining Metallurgy,* 9-22, 1600 w. CJW.

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Carpet Market Significant

THE demand for carpets, which is rapidly increasing, is an indication of clearing skies in the industrial field, in the opinion of *Textile World*. Demand is now so heavy that mills are being sold ahead for a considerable time, and in some instances their output is being rationed out.

The production of carpets was greatly curtailed during the war by the diversion of carpet factories to the manufacture of cotton duck. Carpet stocks in the hands of manufacturers, distributors and retailers were therefore much depleted. Until the present the demand has been so slight that there has been no incentive to fill up the shelves; but now the public apparently is buying again, and the mills are running full blast.

"It is a logical commentary on the general improvement that has taken place in connection with the settlement of strikes and the improved condition of labor that buying of carpets and rugs should have been resumed in such an active way," says *Textile World*.

Other textile lines also are showing increased activity. The New England cotton mills, according to a dispatch in the *Journal of Commerce*, have virtually settled their labor difficulties and are operating on a normal basis. The activity of wool machinery, according to the Bureau of the Census, quoted in *Fibre and Fabric*, is on the increase. The fluctuations of production in this line since 1919 are shown in the illustration on this page. World silk production, according to the *Raw Materials Review* of London, quoted in the *Canadian Textile Journal*, has also advanced. Raw silk production in the Far East is exceeding pre-war levels.

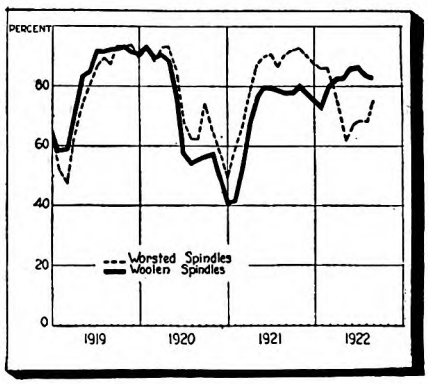
Cotton

Dyeing Cotton Warps. Properties of Naphthol AS and BS. May be used in dyeing of piece goods, raw stock and yarn, giving variety of shades excepting yellow and green. Give better results than beta-naphthol. Both dyes may be saved for further use from a standing bath without suffering any deterioration or loss of strength, though after several days they may become clouded. This is redissolved by addition of caustic soda and castor oil soap. The fibers exhaust the bath to greater degree than does beta-naphthol. This eliminates need of drying between the preparation and developing operations. Simply need to have thorough extraction after impregnation with the naphthol solution. More important shades are red, orange, garnet, pink and blue. First three should be used in full tones only. Methods of working and formulas given. Comparative simplicity and ease with which they may be applied appeals strongly to mill management, for success of present-day dyehouses depends upon simplicity of operation. M. G. Morris, *Am. Dyestuff Reporter*, 9-11-22, 2500 w. CJW.

Dyeing Fabrics. A discussion of various dyes. These include cotton bordeaux, direct violet N, direct violet BS, direct sky blue and FF, direct blue RW, benzoazurine G, direct brilliant blue G, direct blue 2B, and 3B, direct green B and G. Fastness is given in each case and the behavior of the dye toward cotton and mixed materials. Original should be consulted. A. H. Hayes, *National Cleaner and Dyer*, 10-22, 2500 w. CJW.

Lace Curtains. Brief description of gassing, bleaching and dyeing, and lace machine building. *Am. Carpet and Upholstery J.*, 9-22, 800 w. CJW.

Curtains. General description of the method of manufacture of curtains. Use gauze and imitation gauze weave as well as with a checkerboard effect. Special kinds made with two systems of warp and filling threads. Use of swivel weaving in figured curtains. Chenille is a form of fringed combination of threads manufactured for use as a filling for curtains. Numerous threads and fibers extend outward in every direction from the central core. George Rice, *National Laundry J.*, 9-15-22, 1600 w. CJW.



(Federal Reserve Bank, Philadelphia)
Activity of woolen and worsted spindles. In each case, the line represents the percentage of active spindles to the total.

Wool

Carbonizing Raw Wool and Noils. Process of carbonizing consists in transforming vegetable matter into hydrocellulose, which has somewhat the appearance of carbon. Practically all done by means of sulphuric acid or aluminium chloride solutions of suitable strength. Great majority is on noils and small proportion is upon grease stock. Aluminium chloride process considerably harder to handle successfully and is far more expensive to operate but better results appear to justify increased cost in most instances. Actual carbonizing process consists of wetting out or scouring, impregnating with the carbonizing reagent and drying and actual carbonization or baking. Generally dusting follows this third stage. These steps are discussed. Sulphuric acid should range from 3% to 6% actual acid while the aluminium chloride may vary between 6.5% and 9%. In the acid process the material is carbonized at 220° F. until it contains about 1% to 2% condition, while the chloride must be carbonized at 240° F. *Am. Dyestuff Reporter*, 9-11-22, 3000 w. CJW.

Wool Mixtures. Particular finish required for fine wool mixture cloth is naps, cut stripe and velour. Require careful treatment or large amount of damaged material will result. Cut stripe pattern is both neat and attractive. Velours are also popular and made in a variety of qualities, being composed in the main of cotton warps, which make them more durable. Discussion of deficiencies, such as rigged and streaky places when they are put on the gig and dirty marks (stains and grease) which pass from one department to another. Mixture naps have appeared, in many cases being on the lines of woolen warp velours. Quite a number of these have a large check on the back, to be used, when made up, as a lining. Variations in strength found in cloths raised at different times. *Am. Dyestuff Reporter*, 9-25-22, 2000 w. CJW.

Cassimere Finish. Manipulation depends largely upon stock and construction of cloth, as well as final result desired. Close or thread finish requires that all felt and fibers be removed from face of cloth so that woven construction may show up clear and distinct. Discussion of cleaning, raising nap, shearing the cloth and pressing. Velour finish requires well-felted cloth and density of nap, part of which is left. Cloth should be constructed with view of shrinking in length not less than 15%. Natural finish is usually given to goods that are sufficiently free from felt as to be cleared up without any gigging. Layout in loom is more on worsted order. O. Fisk, *Textile World*, 9-16-22, 1200 w. CJW.

Worsted Carding Preparation. Card should be constructed of best materials, should be absolutely true and capable of very fine adjustments. Modern carding engine is constructed of cast iron

cylinders and doffers. Description of construction. Foundation of filleting consists of several layers of cloth, usually cemented together. Cotton, linen or wool may be used. Top layer consists of vulcanized rubber. Pins may be of mild steel to specially hardened steels. Round wire generally used for all purposes except opening rollers. Iron card rollers should be covered with rustless paint. Tensioning machines are used in card nailing, though often nailer has handier methods. In worsted trade sheets almost entirely absent from rollers. Still used in woolen trade for larger rollers. SAMUEL KERSHAW, *Textiles*, 8-22, 1200 w. CJW.

General

Reinforced Hosiery. Improvement has to do more particularly with formation of heel and adjacent portion of stocking. In ordinary type of stocking with high splice in connection with foot formed partially or entirely of undyed or light-colored yarn, high splice is sometimes extended to point in heel below ankle, beginning with narrowing courses which form the heel pocket, at which point juncture is made with yarn from which the foot is formed. Reduces cost of production by effecting saving in yarn forming high splice. Saving is effected by constructing high splice of heavier grade of silk from top to ankle of stocking, at which point heavy silk is withdrawn and heavy mercerized yarn of substantially same weight as that forming high splice is substituted, which extends from ankle of stocking to point far enough below ankle to cover all area of heel likely to show above top of shoe. *Textiles*, 8-22, 1000 w. CJW.

Rewound Filling for Weaving. Actual rewinding process is beneficial to quality of yarn in the fact that considerable dirt and many bunches are removed, and weak places break down. This gives better quality of woven product from loom with less loom stoppage. Bobbin as long as possible with small barrel should be used. Gives very desirable weaving condition in the form of well-made clean package of filling which should unwind with very high percentage of efficiency. Larger bobbin causes gain in production. Other gains enumerated. Actual benefits would vary according to conditions, types of machinery, yarns and possibly other things. Some far-seeing mill men are in favor of rewinding and in many cases adopting it with gratifying results. J. A. SWAINBANK, *Textile World*, 9-23-22, 1600 w. CJW.

Dyehouse Materials. (Continued article.) Dyeing with sulfide colors cannot be carried out in copper vessels. This restriction extends to minor articles as well. Sulfur dye itself does not attack the copper, but the sodium sulfide used as a solvent. Fiber already dyed with sulfide dye may come into contact with copper, provided all dye liquor has been removed, without damage to fiber or copper. Thus copper may be used for certain auxiliary operations. GEORGE EMMONS, *Textile Colorist*, 9-22, 1200 w. CJW.

SALES

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The purpose of all intelligent sales promotion effort is not only to increase the volume of sales, but to reduce the unit expense of selling.

To these ends, scientific market analysis is vital. It stops guesswork and cuts down mistakes. It shows the opportunities for profit and reveals the causes of loss. It replaces impressions with knowledge; conjectures with reason. It brings to sales management the one basis of correct thought, practical plans and successful action.

Scientific market analysis gives the facts—numerically, graphically, geographically. It covers such essential points as knowledge of the product, statistics of past experience, plant capacity, extent of market, potential buying power, selling plans and advertising expenditure.

It has been the pleasure of the Ernst & Ernst organization to assist many of its clients, nationwide, in this fundamental work.

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Grit. Grit in printing color causes snaps, that is, it raises doctor off from the copper roller as it passes by and thus allows some of print color to get by as spot on cloth; may also cause a dart, caused by grit wearing on doctor until a rough place that cannot clean the color well is formed. Thus a series of streaks of the print color gets on the cloth. May be held back by doctor and scratch the roller, thus ruining the engraving. Grit may be removed by straining color and then by allowing them to settle for some time. W. H. THOMAS, *Textile Colorist*, 9-22, 500 w. CJW.

Topping. (Continued article.) Topping with thio-indigo red. Used for sulfur and similar dyes not sensitive to action of sodium sulfide. The dye is treated with a reducing agent and the lecuo compound formed. Hydrosulfite used to prevent premature oxidation, which must take place only after leuco compound has been impregnated into fabric. May be reasons for using the sodium sulfide vat. Thio-indigo red may be used for topping indigo on wool in either vat. Alkali must be rather carefully regulated. When it is desired to secure blends of the two dyes as deep violet or reddish deep blue one proceeds with dyeing as double operation. GEORGE EMMONS, Textile Colorist, 9-22, 3000 w. CJW.

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Container Cars

THE New York Central Railroad, after a long period of preliminary tryouts, is now regularly operating container cars on its lines. The containers are great steel boxes, from six to nine of which are fitted upon a car behind low steel walls which prevent their opening in transit. At the terminals they are hoisted from motor trucks to cars, and back again, by means of cranes, this quickly releasing rolling stock, preventing congestion of tracks and platforms at terminals, and eliminating much manual labor. The containers give the shippers of less than carload lots all the advantage of carload shipment, and in addition give him almost absolute protection against pilferage and damage in transit.

"The accomplishment of a means of loading or unloading a car of less than carload lots of freight within a few minutes alone carries far-reaching potential benefits when we take into consideration the railroad equipment of the country and the inability of the railroads to control this equipment during the peak load of business," said F. S. Gallagher, engineer of rolling stock of the New York Central Lines, to the Society of Terminal Engineers. "In times of heaviest demands, it is known that shippers, while waiting for a change in the market, gladly pay the regulation demurrage charges, rather than unload the car in which their goods were shipped, using the car as a temporary storage place, and tying up equipment that is badly needed.

"The saving in labor and time may be seen by noting in detail the number of times that less-than-carload lots of freight must be handled from the shipper to the consignee.

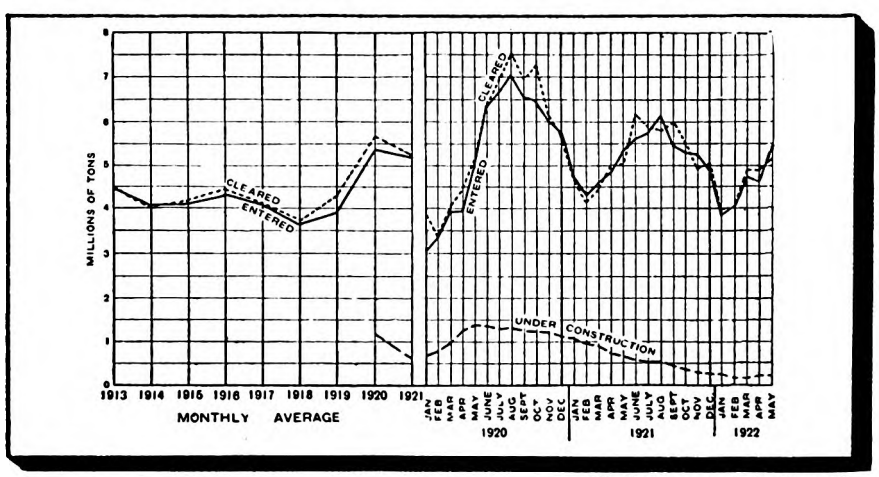
"Instead of having to handle this container shipment of less-than-carload freight thirteen times by man-power, it is handled twice, saving on the same basis as before. That is, on a carload of less-than-carload freight weighing 20,000 pounds, the saving is the lifting by man-power of 220,000 pounds, or 110 tons. This is an economy that we cannot lose sight of, and while it may be said, of course, that there will be an expense incident to the installation of equipment for handling these containers at the various shippers' and consignees' plants, when this equipment is once in the expense ceases. It does not cease with the present method of handling less-than-carload freight, because every time a 20,000-pound carload of less-than-carload freight is handled from shipper to consignee, it requires 260,000 pounds of man-lifting, while the container system would require only 40,000 pounds of lifting, a saving in man-lifting power of 220,000 pounds."

Survey of Electrical Traction on American Railroads. Systems now in service are described and compared for the railroad engineer. The trend of locomotive design is shown. Tabular review of present status is given. Writer does not advocate one system to the exclusion of another and favors further trial of both AC and DC systems. It is considered that the high tension AC has at present the greater number of demonstrated advantages for general railway use and holds out the most promise for the future. G. GIBBS, *Engineering News-Record,* 9-14-22. IG.

Standardization of Shipping Containers. General discussion of problem. First requisite is well-digested general plan that will provide not only for reasonable standards but also for reasonable enforcement of their observance. For each sub-division proposed a specification should also be proposed covering material and methods of manufacture in detail sufficient to enable anyone to make the container. Minimum of strength and efficiency of any type or sub-division would be sufficient to carry and protect its contents when subjected to maximum permissible rough handling of cars under railroad operating rule. Principal difficulty is to fix minimum strength permissible. Methods of collecting necessary data. B. W. DUNN, *Fibre Containers,* 8-22, 1500 w. CJW.

Determination of Rail Wear for Valuation Purposes. Covers description and use of pantograph for accurately measuring wear of rails in field. Rails now rated by scientific analysis of observed deterioration. J. P. NEWELL, *Eng. News-Record,* 8-24-22, 1500 w. CS.

Review of Recent Accidents in New York Subways. Covers recent accidents due to excess water runoff from streets, broken water mains, and short circuits in trains and power houses. ROBERT RIDGWAY, *Eng. News-Record,* 8-24-22, 1200 w. CS.



(U. S. Bureau of the Census)

Entrances and clearances of vessels in U. S. foreign trade, and ships under construction.

Handling Bulky Materials. Rotary car body designed to handle granular or pulverized materials (grains, cereals, cement, etc., as well as liquids). Principal feature consists in utilizing cars in conjunction with pneumatic means for purpose of loading and distribution of contents. Car body is capable of being rotated on bolsters and is provided with loading openings which may be sealed, after which cargo may be discharged and distributed by means of compressed air. Design of car given. Four ways of operation include loading and discharging by combinations of gravity, compressed air and vacuum. RUDOLPH WELCKER, *Compressed Air Magazine,* 8-22, 2000 w. CJW.

Submarine Cargo Carrier. Submarine type proposed, 365 ft. over all, molded breadth of 45 ft. and molded depth of 42 ft., equipped with steam of Diesel engines, capable of making 10 knots per hour, and carrying 7500 tons of freight. Buoyancy altered by taking in or expelling water ballast, which would be controlled by compressed air. Intended to enter Northern waters, tapping resources of Siberia, an immense section rich in gold, silver, platinum, iron, coal, furs, timber and grazing lands. At outlets of rivers, ports could be established. Apart from this service, the distance from Liverpool to Yokohama would be shortened some 5000 miles, or an approximate saving of 36 days. The trip from New York to Nome, Alaska, can be shortened by 1285 miles and a round trip by 2570 miles. Likewise aid shipping from Port Nelson on Hudson Bay, which would tap Saskatchewan wheat fields, to Liverpool. Said that this submergible craft would be safer to run at all times than any surface steamer. S. MORNINGTON, *Compressed Air Mag.,* 9-22, 2000 w. CJW.

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Can We Sell Our Surplus Abroad?

(From page 1746)

Millinery Goods and Textiles

Jas. G. Johnson & Company.

"From our own experience we believe that conditions are materially improving and that next spring should see a return to more normal business conditions.

"Our actual shipments for export during the past six months, while they have been greater than for the same period of 1921, have not been very large, but we are led to belive from the number of inquiries that we are daily receiving, that the retailers in South America and throughout the West Indies have been successful in clearing their shelves of old goods and are once more in the market for new merchandise. We believe, therefore, that in summing up, we are safe in saying that conditions in the export market are showing a very definite and real improvement."

Varnish

Pratt and Lambert, Inc.

"Our export business has picked up considerably during the last three or four months. Reports from our men in the field lead us to feel quite optimistic as to the prospects for business from European countries in the near future, and we can say the same for the Latin American countries."

Safety Razors and Blades

American Safety Razor Corporation.

"We are pleased to inform you, that we find export business in our line shows a decidedly marked improvement over that of last year. We are receiving from our agents all over the world, orders for substantial amounts of our products. We have recently established several new and profitable agencies in South and Central America and not less than a week ago we shipped over three and one-half tons of safety razors and blades to Argentina.

"We also find signs of business improvement in the Near East, and we are agreeably surprised to receive several substantial orders from Constantinople and vicinity with cash attached to each order. Our subsidiary company in London is enjoying the best business of its career and our weekly shipments to that country average more than a quarter of a million blades. Our old established agents find that their intensive sales efforts of past years are now being rewarded by the unusual demand from the consumers in their various countries; and while we will not go so far as to say that our volume of business at present is equal to that of war times, you may quote us as saying that we find export business at present in a very healthy and prosperous condition."

Electrical Supplies

The Bryant Electric Company.

"Our export business is picking up. We do not wish to appear unduly optimistic, but certainly the figures of our export trade present an encouraging aspect. Assuming that the year 1913 may be considered as a basic normal year, a comparison of our export figures of the past year and a half, to those of 1913, is quite interesting.

"Our volume of export business for 1921 was approximately three times that of 1913. The first eight months of 1922 have in turn produced approximately 30% more export business than the corresponding months of 1921. Inasmuch as the current month bids fair to surpass all others of 1922, and because there has been a generally steady increase since the first of 1922, it seems safe to state that the total 1922 figures will undoubtedly be at least 30% better than in 1921."

With the Financiers

(From page 1758)

more object-lesson as to the part played by them in upholding the nation. There has been no lack of criticism of the banks as guardians of the chief financial resources of the country. Some of it may have been justified. But as we saw in the huge flotation of Government bonds during the war, and as we may see in the present refunding loan, the banks are ready to make themselves bulwarks of the public. Like Tommy Atkins, they may be slighted in piping times of peace, but when a financial emergency comes upon us we turn eagerly to banks as the servants and supporters of national credit."

England Paying Her War Debts

BRITAIN has started to pay her debt to the United States. J. P. Morgan & Co., her fiscal agents, have deposited $50,000,000 in the Federal Reserve Bank of New York as a part payment of back interest on the $4,277,000,000 which Britain owes us. Early in November Sir Robert Horne will be in Washington to arrange the refunding of the entire debt.

Britain is able to do this only by shouldering a tremendous burden of taxation. The British Government is now collecting more than 30% of the income of its people. Moreover, as the *New York World* points out, this is being done in the midst of a devastating depression in British trade, and at a time when England is compelled to support more than a million unemployed. In the face of all this, England is starting to pay what she owes, although she cannot hope to collect more than a small fraction—if any—of that which is owed to her.

"Undoubtedly the determination of England to remain a financial power of the first class is the main reason why," says *The New York World*, "she is proceeding in such business-like fashion. But there is also behind it a statesman's policy. London knows, as Mr. McKenna's address so clearly stated, that the recovery of Europe depends upon the handling of debts and reparations as one world problem. London knows too that her debt to us must be distinguished from all the other debts. The distinction is economic. England can pay in full. Nobody else, not Germany, not France, not Italy, can. Therefore, before a real financial settlement is possible, the debt must be removed from the field of debate."

Labor

(From page 1759)

Federal coal commission, thanks to Senator Borah's foresight.

"There may be a strike in the spring in spite of the commission, but if it does its work well there should be none. Before that time the facts concerning coal production and distribution should be on the table for everyone to see. Before that time it should be possible to settle on a living wage based on figures which neither side can attack. It lies in the power of the commission to make a strike inexcusable if not impossible."

The union officials and the operators' association representatives have already met in conference to consider means of avoiding next year's strike. Perhaps the Government coal commission also will break tradition and do something.

Steel Trade Needs Help

THE shortage of common labor apparently is bothering the steel trade. *Iron Age* says:

"The dwindling of the supply of strong men for common labor in the United States has become a serious matter. Everywhere a scarcity is reported, with no relief in sight, The coming of winter will transfer men from outdoor to indoor employment, which will help temporarily, but even for these few months it seems improbable that the supply will equal the demand. While industry has improved throughout the country, it is by no means at a high level, taking it all in all. Therefore employers are wondering what can be done about labor when demand really becomes strong.

"The plan of limiting immigration on a percentage basis has not worked out at all well in providing good common labor. In this respect the literacy test has done harm, for an alien must be able to read a few words in his own or any other language in order to be admitted. The superficially educated may come in unchallenged, but the man of thew and sinew, who is content to sell his strength and willingness for common labor, must lay aside his ambition to immigrate, because he has never been taught to read even a little.

"The percentage of husky laborers among the immigrants of the past year has been very small. The large industries which have had agents seeking these men among the new arrivals, as steamers docked, discovered this early and found no improvement as time went on. The newcomers were either physically unfit for hard labor, or were unwilling to accept such employment. New and hitherto undreamed-of influences have entered the labor situation. For example, everywhere in the country able-bodied men are taking the places of women in the eating places, which are springing up by thousands, not only in the cities and their suburbs, but even in the smallest towns. Foreigners are becoming small merchants, too, and their community stores are doing business in large numbers. These factors alone account for tens of thousands of immigrants who a decade ago quite naturally would have drifted into other industries."

The INDUSTRIAL CALENDAR

Secretaries of Associations are invited to send us the dates of their conventions as early as possible so that their conventions may be properly listed below. When especially requested by Association Secretaries, we will send dates and other available notices concerning meetings of other associations.

Oct. 23-30. *Annual Business Show,* Grand Central Palace, New York City. (Mr. Tate, Manager.)

Oct. 30-31. *Society of Automotive Engineers, meeting of Parts and Fittings Division, Standards Committee, and Transmission Division, Standards Committee,* Detroit, Mich.

Oct. 30-Nov. 3. *Association of Railway Electrical Engineers,* Hotel La Salle, Chicago, Ill.

Oct. 30-Nov. 11. *National Food Show,* 102d Engineers Armory, New York City.

Nov. 1-3. *Society of Automotive Engineers, meeting of Passenger Car Division, Standards Committee, with Passenger Car Body Division, Standards Committee, with Electric Vehicle Division, Standards Committee.*

Nov. 6-7. *Society of Automotive Engineers, meeting of Engine Division, Standards Committee, with Agricultural Power and Stationary Engine Divisions, Standards Committee,* Chicago, Ill.

Nov. 6-7. *Eastern Assn. of Cleaners and Dyers,* Reading, Pa.

Nov. 8-9. *Society of Naval Architects and Marine Engineers,* New York City.

Nov. 8-10. *Associated Cooperage Industries of America,* Sherman Hotel, Chicago, Ill.

Nov. 9-10. *Southern Furniture Manufacturers Association,* Sheraton Hotel, High Point, N. C.

Nov. 11. *New York State A.A.E. meeting,* New York City. Tentative.

Nov. 13-15. *Southwestern Assn. of Cleaners and Dyers,* Joplin, Mo. (Tentative.)

Nov. 13-18. *Automotive Equipment Assn.,* Chicago, Ill.

Nov. 14-16. *North Carolina Section of the American Water Works Assn.,* Gastonia, N. C. (Thorndike Saville, Secretary, Chapel Hill, N. C.)

Nov. 14-16. *City Managers' Association,* Baltimore Hotel, Kansas City, Mo.

Nov. 15-16. *National Industrial Traffic League,* Hotel Commodore, New York City. (J. H. Beek, Secretary, Chicago, Ill.)

Nov. 15-17. *American Bottlers of Carbonated Beverages Convention,* Atlanta, Ga. (Junior Owens, Secretary, 726 Bond Bldg., Washington, D. C.)

Nov. 15-17. *Southern Sash, Door & Millwork Manufacturers Association,* Atlanta, Ga.

Nov. 15-17. *Canadian Institute of Mining and Metallurgy,* Vancouver, B. C. (G. C. Mackenzie, Secretary-Treasurer, Montreal, Quebec.)

Nov. 16-18. *New England Advertising Men,* Providence, R. I. (H. Harold Price, Secretary, the Town Criers of Rhode Island Convention Committee, P. O. Box 947, Providence, R. I.)

Nov. 17. *American Electrochemical Society,* New York City.

Nov. 17-26. *International Health and Safety Exposition,* Municipal Auditorium, Oakland, Cal. (Blanks Everett, Secretary.)

Nov. 20-25. *National Hotel Exposition,* Grand Central Palace, New York City. (Mark A. Cadwell, Secretary, 334 Fifth Ave., New York City.)

Nov. 22-23. *National Founders Assn.,* Chicago, Ill. (J. M. Taylor, 29 South La Salle St., Chicago, Ill.)

Nov. 22-23. *New York State Industrial Conference,* Buffalo, N. Y.

Nov. 23-25. *Western Planing Mill & Woodworking Congress,* Palace Hotel, San Francisco, Cal.

December. *Automobile Show,* Pasadena, Cal. (E. C. Lindley, Secretary.)

Dec. 1. *Society of Chemical Industry,* New York City.

Dec. 3-9. *Automobile Salon,* Commodore Hotel, New York City.

Dec. 4-7. *American Society of Mechanical Engineers,* Engineering Societies Building, 29 West 39th St., New York City. (Calvin W. Rice, Secretary.)

Dec. 5-6. *National Glass Distributors' Association,* Pittsburgh, Pa.

Dec. 5-8. *Implement Dealers' Association,* in Lansing, Mich.; Wilwaukee, Wis.; Sioux Falls, S. D.; Indianapolis, Ind. (L. F. Wolf, Secretary of Michigan Section, Mt. Clemons, Mich.)

Dec. 7-13. *Exposition of Power and Mechanical Engineering,* Grand Central Palace, New York City. (F. W. Payne, Secretary, Grand Central Palace, New York City.)

Dec. 8. *American Chemical Society,* New York City.

Dec. 11-15. *Implement Dealers' Association,* in Des Moines, Ia., and Peoria, Ill. (T. F. Wherry, Secretary of the Iowa section, Des Moines, Ia., and Oscar Keller, Secretary of the Illinois section, Quincy, Ill.)

Dec. 11-16. *National Food Show,* Grand Rapids Armory, Grand Rapids, Mich.

Dec. 13-15. *Coal Mining Institute of America,* Chamber of Commerce Auditorium, Pittsburgh, Pa. (H. D. Mason, Jr., Secretary, 911 Chamber of Commerce Bldg., Pittsburgh, Pa.)

Foreign Events

Nov. 3-11. *Olympia Automobile Show,* London, England.

Nov. 9-19. *Annual Exhibition Automovil Club Argentino,* Buenos Aires, Argentine.

Nov. 10-Dec. 19. *Automobile Show,* Palais de la Cinquantenaire, Brussels, Belgium.

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- Coordinate Paper in Large Sheets
- Curve Cards
- Chart Outfits
- Millimeter Paper
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- Bargraph Paper
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- State Maps
- County Maps
- Export Maps
- Edexco Special Map Mount

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November 11

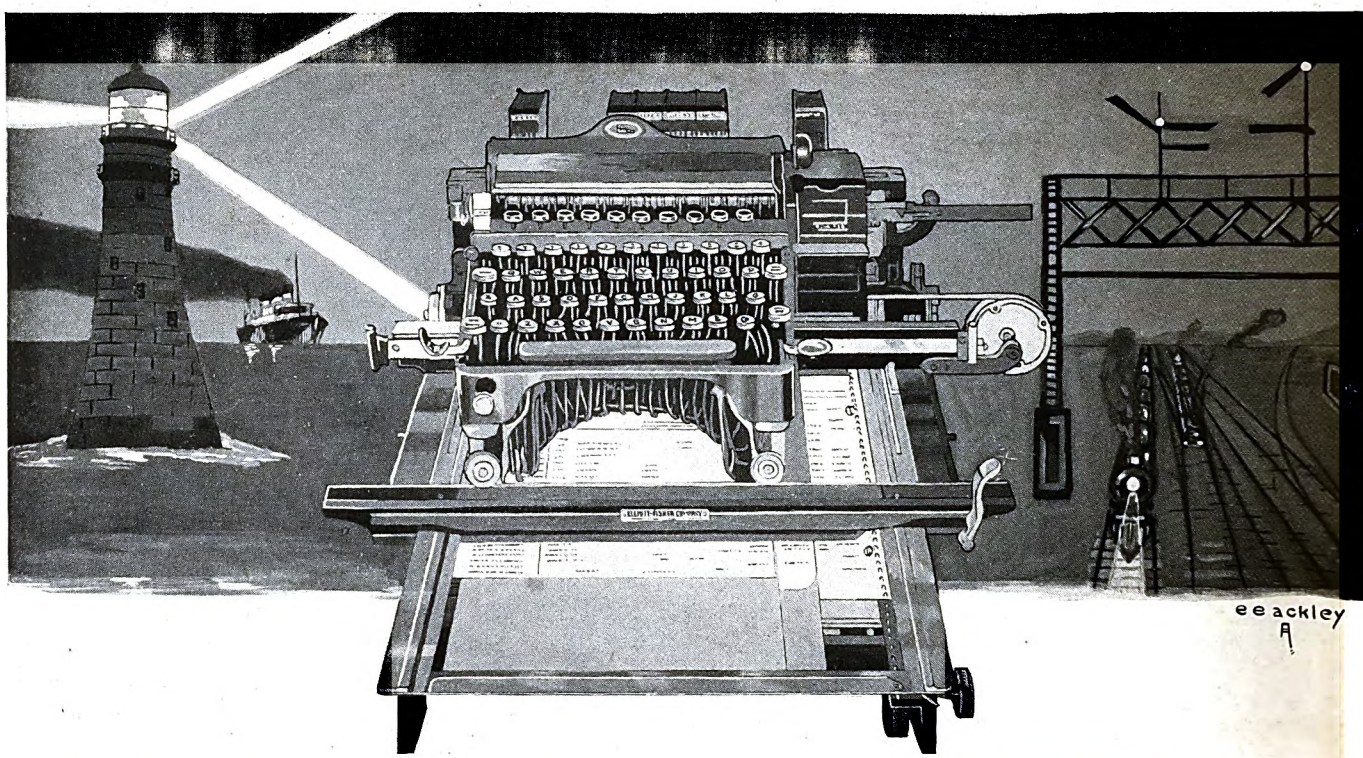
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Is a Merchant Marine Worth $40,000,000 a Year?

See page 1808

Prentice W[illegible]



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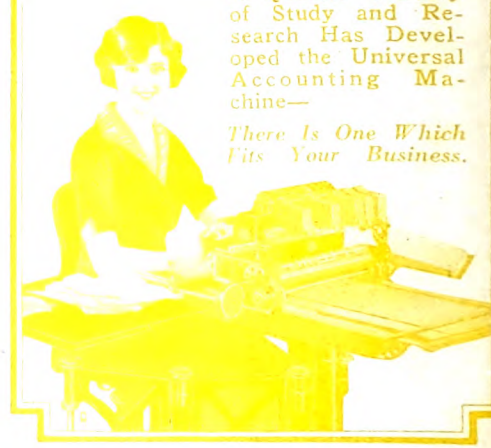
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* Lack of Capital	30.3
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* Fraud	7.0
Failure of others	1.7
Extravagance	1.1
Neglect	1.7
Competition	1.1
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Speculation	.7
Total	100.00%

* These are the needless failures that a well rounded business training would prevent.

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THE INDUSTRIAL DIGEST

A fortnightly digest of the informative articles in one thousand leading industrial magazines covering thirty industries

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Are you a member of the "*Can't Find-Time-to-Read*" Club?

"I SIMPLY can't find time to read the magazines and newspapers that I know I ought to read." These words were said to us not only by one leading business man, but by hundreds of leading business men. On their desks, in their offices—on the tables in the directors' rooms, on the bookcases at home, stand piles of trade and technical publications and newspapers containing a veritable gold mine of information. And yet, valuable and important as that information is, it has been impossible for thousands of business men to spend the time necessary to dig it out.

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Do we need to emphasize the comparison?

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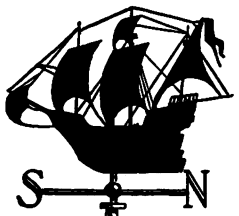
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No. 27

THE
INDVSTRIAL DIGEST

Nov. 11
1922



The Business Weathervane

A Summary of Expert Opinion

That business is in excellent condition, that fundamental factors are all indicative of a continuation of the present volume of orders and a maintenance, if not an actual increase in the price level, are the conclusions drawn from the last two weeks by economic experts.

As **Dun's Review** says, the general tenor of reports continues to indicate good business for the fall and winter:

"Evidence is clear that the main trend of business continues upward, and a basis exists for the prevailing belief in further gains to follow. The movement, however, is marked by irregularities and contrasts, and the recent feverish activity in buying in some quarters has not been maintained. In considering present conditions, the fact should not be disregarded that many trades and industries have already experienced decisive recovery from previous depression, that wholesale prices have risen sharply, and that fluctuations in demand are logically to be expected. Statistics of freight more nearly equal the best previous records, but car shortages still hinder the distribution of commodities in different sections of the country and instances are noted where some business cannot be accepted because of the impediments in transportation."

And **Bradstreet's** finds that "wholesale and jobbing lines report trade maintained at a fair to good volume, with textiles and wearing apparel lines leading. There is more optimism as to trade for winter and early spring, but a recurrence of warm weather is widely reported as causing retail buying to lag a little behind primary distribution. Industry, though variable, still keeps up a pretty fast pace, and employment seems more widely diffused than for over two years past. Collections still tend to lag, although a shade better than in recent weeks. **Bradstreet's** Weekly Food Index is slightly lower, but increases exceed decreases in commodities as a whole."



(Indianapolis News)

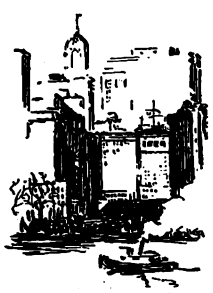
A voracious appetite for which to provide.

Reports received by the **Department of Commerce** that "the most important development of recent weeks is the marked increase in the demand for goods. Current wholesale distribution is said to be far in excess of this time last year. Retailers have been buying largely on a hand-to-mouth basis for many months. Their stocks have been depleted by the renewed buying.

"Increased employment and higher wages have been largely responsible for this enlarged demand. The comparatively low prices for farm products have checked rural buying to a certain extent, but the large crops produced at comparatively low costs will give the farmers a margin of profit which will ultimately be reflected in merchandising lines."

The **Brookmire Economic Service** analyzes the present upswing as follows: "It would be rather absurd to try to name day or date for the end of the present period of active business. However . . . we can say definitely from the basis of past experience that it will last at least during the summer of 1923. Further than that we have no definite basis of prediction.

"This is by no means a definite prediction that business will turn down at that time for, as said above, there are no measures in existence at present by which a definite date for its termination can be arrived at. It merely means that on the balance of probabilities it would be unsafe, from present indications, to plan beyond that period. Fundamentally it will last as long as the demand for products chiefly from industrial centers remains active. . . . In brief, we look for a sharp but relatively short rise in general prices which, in all probability, will last not longer than a year from the present and which will be centered in great part in the industrial sections of the country."



The Fortnight

THE net result of the elections seems to be the establishment of a new bloc type of government. The liberal bloc is here. In several States the Senators elected on a liberal platform bear the Republican label, and in many others they bear the Democratic label. But Borah, LaFollette, Johnson, et al, will hold the balance of power for the next two years.

This means either one of two things—there will be progressive action or there will be no action. The Progressives will hold a veto power strong enough to block any measure they wish to kill. However, they will be just as helpless as the conservative element when it comes to positive action. Unless the Administration is willing to adopt a more progressive attitude, legislation will be slow and difficult until the next Presidential election.

Business men see certain definite possibilities in the election. The first is the liberalization of the Federal Reserve administration—and the certainty of election to the Governorship of some other than W. P. G. Harding. The second is the likelihood of the Tariff Commission's immediate downward revision of many important schedules. A third is the probable passage of the Great Lakes-St. Lawrence waterway measure in return for farm support for other Administration bills. The ship subsidy bill, which is so thoroughly discussed in the current issue, and which is to be taken up during the present session of Congress, is apt to prove a stumbling block in the path of Legislative action. Present indications are that the bill will pass the House, but be held up in the Senate. A more lenient handling of strikes by the Department of Justice is certain to be an outcome of the election. Prohibition was given a severe setback, and all political signs point to light wines and beers as a national issue within the next two years.

Taken as a whole, the elections mean that political power, for two years at least, is to be in the hands of legislators representing, primarily, the farm interests, and inasmuch as the farm population represents about 43% of our total purchasing power, business men need have no fear as to the excellence of trade during that period.

All observers agree that prices will continue high, sales will continue large and wages will continue to advance. As to the length of time over which these conditions will exist, opinions radically differ. Without exception all of the foremost economists believe that it will continue through the better part of 1923.



(Brooklyn Daily Eagle)
Not a shrinkage—a washout.

Shipping Conditions Are Better

THE transportation situation has improved a great deal. With loadings of freight aggregating a million cars a week industries are still complaining because it is impossible to get sufficient cars to handle raw materials and deliver finished products. In the West and South crops are reported rotting in the fields—farmers have been unable to move them on account of a car shortage or confiscatory rates.

Now that the bulk of the movable crops has been largely transported, manufacturers will find the strain lessening. Cars will be more plentiful and the transportation situation should be less of a problem from now on.

For the first time since the armistice, the country is free from any great strike or from the danger of one. Wages are still comparatively high, and all indications point to a remarkable Christmas trade. All of the basic industries are working at a normal rate of activity, though the iron and steel industry is not running to capacity even yet.

Our policy of restricting immigration has resulted in a labor shortage which has resulted in keeping wages high, and consequently keeps a large volume of money in circulation. Unless some unforeseen obstacle, such as another war, should throw itself in the way business is on a smooth road for twelve months.

Our Foreign Trade Activities

ON another page in this issue the foreign situation has been treated in more detail, but certain points of the Administration's foreign policy are of enough importance to discuss here.

Realizing that the tariff has had, or will have, a harmful influence on European purchases of American goods, Department of Commerce officials, working with the Department of State, are said to have formulated a policy to offset this factor. First will come a more active participation by the U. S. in efforts to stabilize European currencies. The urge and importance of this is seen in the recent slump of the mark and franc. Second, efforts will be made to establish credits for

in Perspective

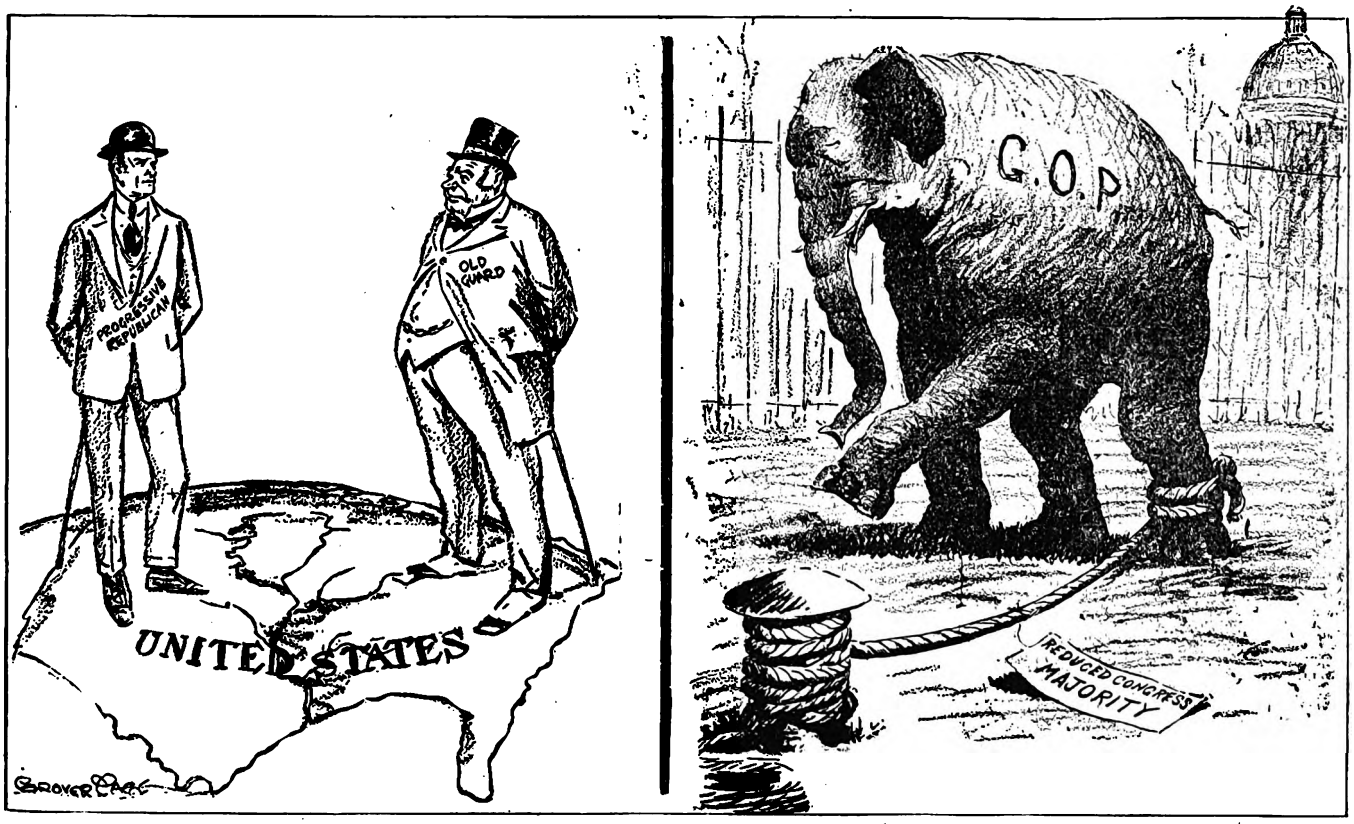
Europe that will bring the Continent into the American market more actively. How this is to be done without nullifying the Foreign Debt Funding law remains a mystery, but that the Administration is endeavoring to put this program through seems certain.

The Progressive's Program

EVEN though the new Progressive bloc is unable to force direct measures which it may advocate, still certain projects are likely to come before Congress which would otherwise receive no attention. The Newberry carcass is sure to be dragged out into the limelight again. The Teapot Dome oil lease of Sinclair fame is another sore spot which is likely to receive attention from Senator LaFollette. Recognition of Mexico will be strongly urged, we are informed, by some of the Progressive bloc. The enactment of a new rural credits system, independent of Federal Reserve control, is another feature of the Progressive program. It is even possible that the report of the recently appointed Coal Commission will be utilized as a basis for a campaign to nationalize the mines or to bring coal prices and wages under the complete control of a fuel commission. The naturalization of the Muscle Shoals project, or the acceptance of the Ford offer, are alternatives which the Progressive group will present to Congress. The advocates of the bonus, or "adjusted compensation," are already calling attention to the defeat of practically all of the supporters of the President's veto. At the recent American Legion convention approval of continued attempts to secure the bonus were cheered to the limit, and beyond question the bonus bill will be up again next year. This time it has a better chance of passing.

Continued Warm Weather Upsets Business

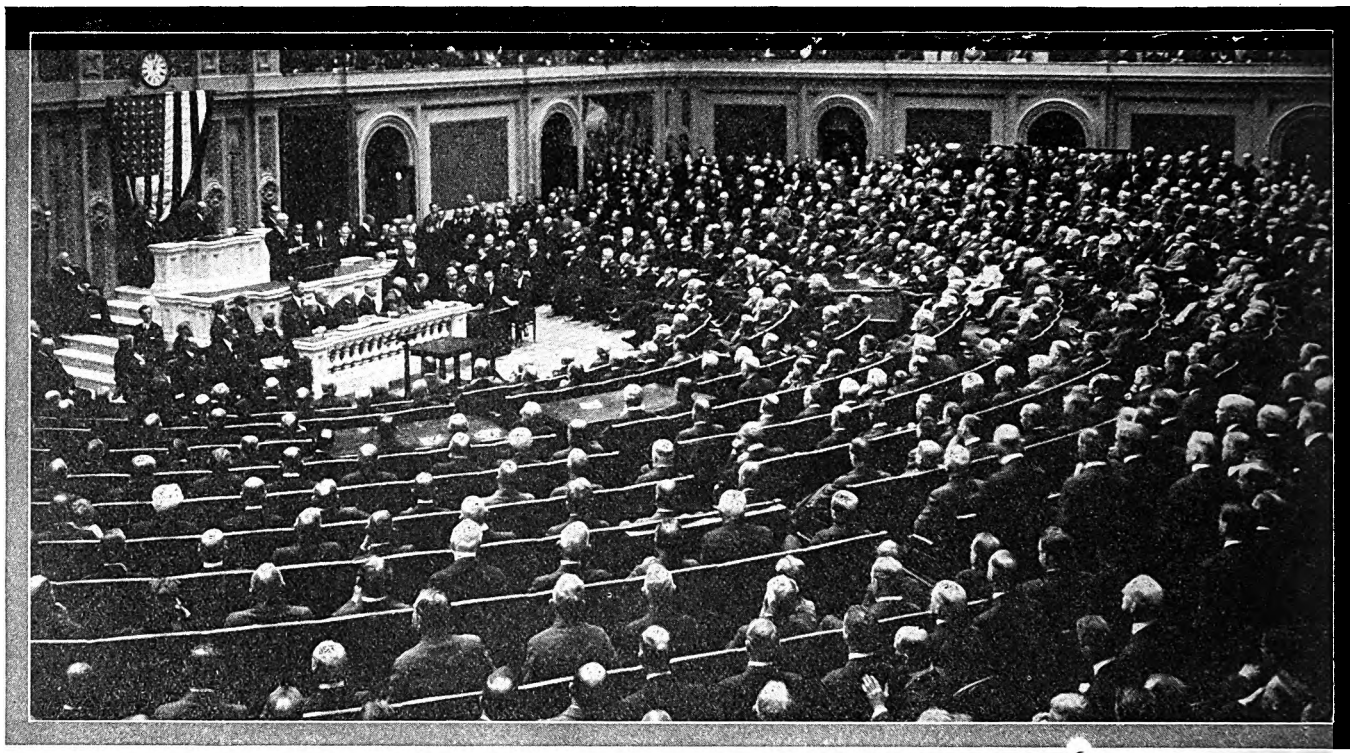
WARM weather has had a more far-reaching effect on business than is generally supposed. To be sure it has decreased purchases of coal and fuel and cut down the income of gas and electric power companies. Then, too, it has relieved the shipping situation by lessening the amount of coal to be handled by the roads, but it has had even more important effects: The persistence of fine warm weather is credited with inducing a great deal more than seasonal activity in building. Manufacturers of lumber, paints, steel, brick, cement, and other structural materials are benefiting thereby. The warm spell has hit the wool industry and the retail clothing trade a rather hard blow. Sales of heavy winter garments have been remarkably small in most sections and the woolen mills are feeling the pressure. The cold spell will come and sales will pick up but, until they do, retail merchants will have to depend upon Christmas trade to keep their heads above water, especially in cases where they have invested heavily in large stocks which have been slow to move. In other retail lines the fact that warm weather has kept people out of doors is looked upon as the reason for an increased buying in the pre-holiday season.



(Louisville Courier-Journal)
"East is east, and west is west."

(Brooklyn Daily Eagle)
Giving him less rope.

Views of the election after the land has slid



The House of Representatives, whose political complexion has been considerably altered by the recent election.

"Now That Elections Are Over"—

What Is the Business Significance of the Results?

"THE tumult and the shouting dies," and politically speaking, the country lapses into quietude for the next few months. And in the clear, cold light of the morning after, exactly what are the results of the election?

First: It is apparent that the policies of the Harding Administration have received a severe set-back. Democratic gains were country-wide, and in several States the upsets were startling. What effect will this rebuke to the "back to normalcy program" have on business?

Well, in the first place, the high tariff has been repudiated. In order to save what credit was left out of the wreck, the Administration is very apt to urge the Tariff Commission into action at an early date. This is expected to result in lower rates on many lines of commodities, and decided increase in imports, according to experienced observers.

The progressive Middle West and West (represented to a great extent in the present Congress by the farm bloc) have repudiated the Fordney-McCumber tariff quite as strongly as have the Eastern States which were expected to turn against the measure. While the East feels that the bill will harm business, the Western States with their large progressive element believe that it will increase the cost of living, and this was the reason for the vote which decreased the Republican majority, according to reports.

General business opinion concerning the election is pretty well reflected in the following quotation from the *Bache Review:*

"Soberly considering the results of the election upon business and securities, the question is how far will constructive legislation in the future be aided, or, on the other hand, to what extent will radical movements be allowed to materialize into disturbing legislation, after the new Congress takes its seat. For one thing, the reduction in the Republican majority in the House should have a sobering effect upon the remnant still left in power there, and should lead to sane conduct to take the place of two years of pusillanimity. The definition of the latter word is, 'cowardice'; and the widely prevailing existence of that quality in nearly everything Congress has undertaken for the last two years is one powerful reason for the country's disapproval expressed in the vote.

"On the other hand, the disturbing feature in the result is the preponderance of the farm bloc, which will come into greater power in the new Congress. The first legislative measures which the Administration succeeded in defeating, like the bonus bill, will undoubtedly again be championed. The national legislative outlook is not bullish and this eventually will have its effect upon securities.'

This power of the farm bloc is looked upon in other quarters, however, as of real benefit to business, since farmer prosperity is the foundation of all good business. Moreover, although more progressive than the Old Guard, the bloc is still moderate and conservative where business interests and economy in Government bureaus are concerned.

In some quarters, it is held that the reaction in the Middle Western States was due in part at least to antagonism to the deflation policies of the Federal Reserve Board under the present Administration. So far as this point is concerned, the results of the election may find expression in a more cautious handling of the re-discount rate, and in all probability the appointment of a new governor to succeed Governor Harding.

The soldier vote, according to most newspapers went solidly anti-administration. Whether this can be attributed to the bonus veto of the President or whether it is in some measure due to the labor policy of Attorney-General Daugherty remains to be seen. On the theory that it was largely due to a resentment regarding the vetoing of the bonus measure,

reports are in circulation to the effect that the President is willing to permit the next Congress to pass a bonus bill, and will offer no objections in the shape of a veto, providing he is given the support of the current Congress in passing the ship subsidy bill which is so close to the Administration's heart.

This would seem to savor of making the best face possible after eating sour grapes, because most political observers agree that the next Congress will be able to pass a bonus over the President's head, while it would not be likely under any circumstances to permit a ship subsidy to be jammed through. The reason for this, of course, is that the independent wing of the Republican party will have the balance of power in the next Congress. Johnson, Borah and LaFollette are likely to play a prominent part in dictating the measures which the next Congress will pass.



(Baltimore Sun)

Congressmen at last start work.

There is another feature of the election which may have an indirect effect upon business. Senator Lodge came closer to defeat than in all the years he has been in the Senate, and this together with the general trend of opinion as reflected in leading magazines is likely to make the Administration very cautious in regard to its foreign policies. Since our foreign policy at present is based on the question of international debt refunding and reestablishment of Europe on a sound financial basis, it is quite possible that a more rational view of the debt question will be taken by Congress than during the present session.

Labor organs hail the results of the election as a reply to the war with injunctions which Attorney-General Daugherty has waged against the coal miners and the rail unions. These papers claim that unless the Administration wishes to completely ruin its chance of victory at the next election that it will tread very lightly when the word "injunction" is spoken.

Among other things the election brought forward a certain amount of presidential timber from the Democratic camp and greatly lessened the chances of certain Republican gentlemen to secure the nomination to succeed President Harding.

That the progressive wing of the Republican party has been greatly strengthened by the election seems to be a generally accepted fact, and that this augurs well for business within the next two years is the opinion of many of our newspaper and business paper editors, particularly in the Central and Western States.

Political upsets have been occurring in Europe as well as in the United States. In Germany the ministry of Dr. Wirth has been overthrown, and in England Lloyd George, the last surviving member of the Big Four of Versailles, has at length been defeated. These political events resemble the reversal in the United States in two respects: First, they give evidence of political confusion and uncertainty in the minds of the people, who are more fully aware of what they oppose than what they favor; and second, they show an increase in the power of the radical element.

The chief power which overthrew Dr. Wirth was wielded by the more radical German parties. The radicals are not strong enough to form a ministry of their own, but they can make it uncomfortable for any one else who tries to run the government. The Wirth ministry was forced by the dangerous economic condition of the country to flirt with the industrialists—the big business men of the Stinnes type; and the radicals resented this.

In Germany, as in the United States, the balance of power is in doubt. Alliances between blocs are necessary to form cabinets. The people are under stress, and in great uncertainty.

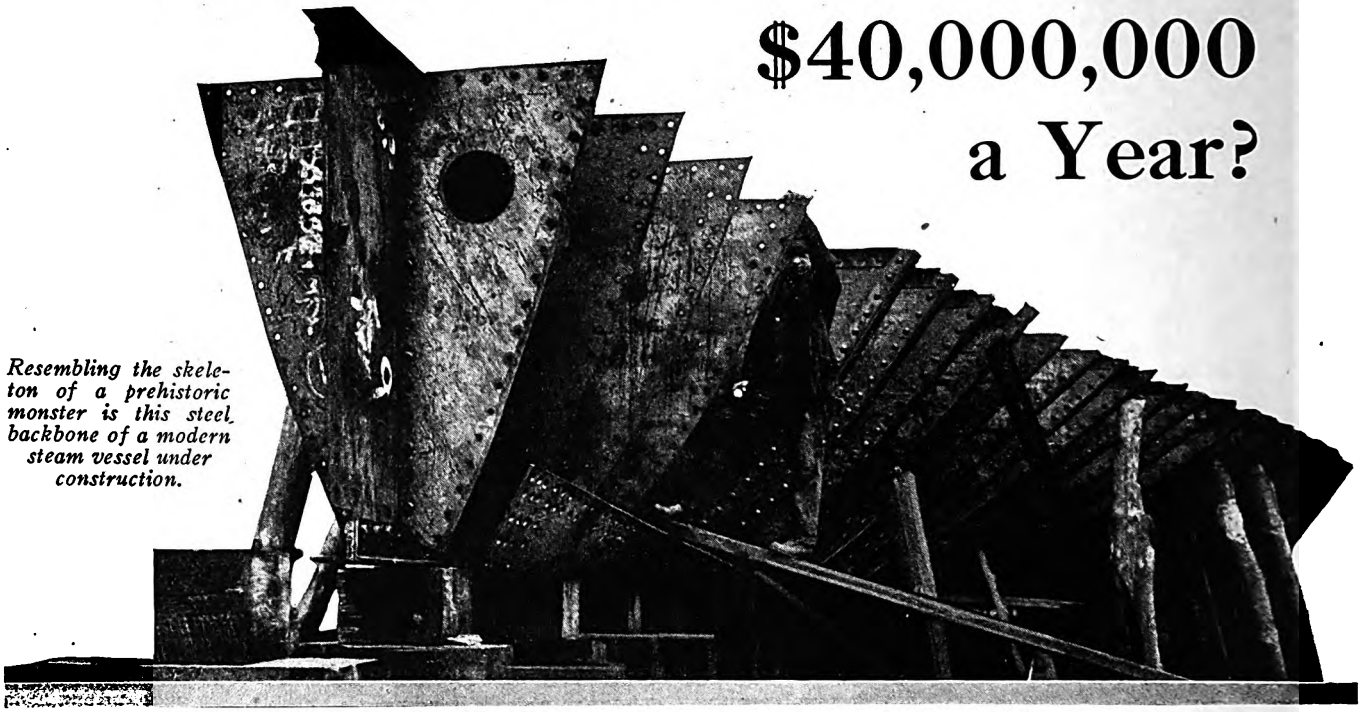
The situation in Britain, though really not as important to the welfare of the world as that in Germany, seems nearer to us, and has attracted more attention in this country. For a long period Lloyd George had been losing strength. The country has been turning away from the coalition of Liberals and Conservatives—with the Conservatives predominating,—which kept the Prime Minister in power. The leadership of the Liberal party had been in doubt for a long ago, and therefore the Conservatives alone were in a position to take advantage of the Coalition's weakness. Therefore, after winning several local elections, the Conservatives felt themselves strong enough to act, and successfully demanded Lloyd George's resignation.

In the election which followed the Conservatives won an overwhelming victory. This does not mean that the British people favor what we know as conservative policies. The election was not fought over policies. It was purely a party affair.

The most significant feature was not the victory of the Conservatives. Their success was merely a matter of political astuteness and luck; they had the whip hand at the right time. Far more important is the fact that the Labor Party, which ran second—Lloyd George was a poor last—is now for the first time in the history of Britain strong enough to be the official opposition. So many people were sufficiently dissatisfied with all the old parties, and sufficiently hopeful of the radicals to cast their votes for the avowedly socialistic Labor Party, that these radicals are now in a position to worry the party in power.

The result of the election, however, is not nearly so sensational as it would be if party labels in Britain still meant what they use to mean. But just as in this country, the parties in Britain have lost their old characteristics. The labels Conservative and Liberal are almost as meaningless as Democratic and Republican; and nobody has had an opportunity yet to learn just what Labor means in a political sense. The Conservative Party is a conglomeration of men ranging from old-fashioned Tories to men whose principles are what we would call liberal. The election was not clear-cut nor decisive. Like the election in the United States and the upsets in Germany, it is a symptom of unrest, uncertainty and confusion.

Is a Merchant Marine Worth $40,000,000 a Year?



Resembling the skeleton of a prehistoric monster is this steel backbone of a modern steam vessel under construction.

What the Administration's shipping policy means to the manufacturer—a summary of the "for" and "against" arguments

HAVE you an opinion on the ship subsidy bill? President Harding has already called Congress in special session November 20 to settle the fate of this measure, and to decide the Administration's attitude. The action taken during that session will affect your income and your business. The subsidy, if approved, will cost the Treasury of the United States about $40,000,000 a year, according to conservative estimates; and a large part of that sum will be paid in taxes by manufacturers. The object of the bill is to encourage the maintenance of an American-owned merchant fleet which may carry the products of America's factories to foreign customers, and which will be able to serve this country in a commercial and military way in case another war is started. Perhaps the results will be worth the cost. In this article *the* INDUSTRIAL DIGEST presents the most important facts necessary to the understanding of the subsidy question. The provisions of the present bill are summarized, and arguments for and against are presented. He who reads it will be able to follow with better understanding the efforts of the Administration to put the bill through, and to form his own opinion on the merits of the case.—*The Editor.*

DO we want to spend $40,000,000 a year in an effort to build up a privately owned merchant marine that will carry more than half of our imports and exports? That is the question which President Harding will ask Congress to decide in the special session beginning November 20.

The Administration believes that America should have a great merchant marine, and that a subsidy will help to get one for us. The Shipping Board, working with a joint commission from both houses of Congress, has drafted the bill which Congress is now to consider, and which the Administration favors so strongly that it has pulled countless political wires to insure its passage.

The bill was introduced in the House of Representatives on June 14 by Representative Greene of Mississippi. In spite of the efforts of the Administration leaders, it could not be brought before the House in time for passage before election.

Three kinds of assistance to private capital in the construction and maintenance of a merchant marine are provided in the bill:

(1) A revolving fund for loans to shipbuilders.
(2) Direct payments of money to ship operators.
(3) Indirect aids to ship operators, such as the remission of taxes.

The revolving fund, to be known as the United States Shipping Board Construction Loan Fund, is to contain not more than $125,000,000. The board is to use it to aid United States citizens to build the most efficient vessels possible, in privately owned shipyards, and to help them equip old vessels with the most modern machinery and commercial appliances. Loans from the fund may be made for periods of 15 years, and may bear 2% interest or more. Loans may be made, in the cases of new building projects, up to two-thirds of the

Photograph for cover illustration by courtesy of the Todd Shipyards Corp.

cost of the vessel; and, in the case of re-equipment, up to two-thirds of the cost of the equipment or of the total value of the vessel as re-equipped, whichever is the lesser. The board is to hold a first lien on the vessel as security, and all payments of interest and principal are to go back to the fund.

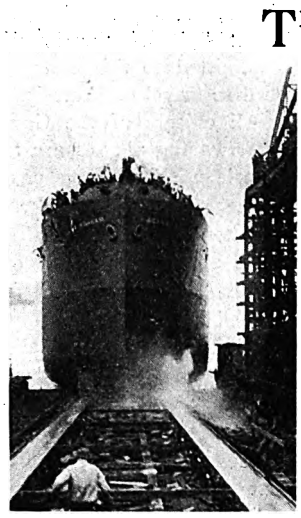
The direct payments of money to ship operators constitute the ship subsidy proper, which is the feature of the bill that doubtless will be most discussed. Payments are to be made out of a fund to be known as the Merchant Marine Fund, into which is to be paid 10% of all the customs receipts of the country, all tonnage duties and similar taxes levied upon vessels entering our ports, and the mail payments now made to American ship operators, who, when subsidized, will be required to carry free all mail except parcels post. The board is empowered to make 10-year contracts with ship operators to run subsidized lines.

All subsidized vessels will get a half cent per gross ton for every 100 nautical miles they travel over approved courses. Faster vessels are to get additional subsidies according to this scale:

0.1	cent	per	gross	ton	per	100	miles	for	vessels	making	12-13 knots
.2	"	"	"	"	"	"	"	"	"	"	13-14 "
.3	"	"	"	"	"	"	"	"	"	"	14-15 "
.4	"	"	"	"	"	"	"	"	"	"	15-16 "
.5	"	"	"	"	"	"	"	"	"	"	16-17 "
.7	"	"	"	"	"	"	"	"	"	"	17-18 "
.9	"	"	"	"	"	"	"	"	"	"	18-19 "
1.1	"	"	"	"	"	"	"	"	"	"	19-20 "
1.3	"	"	"	"	"	"	"	"	"	"	20-21 "
1.5	"	"	"	"	"	"	"	"	"	"	21-22 "
1.8	"	"	"	"	"	"	"	"	"	"	22-23 "
2.1	"	"	"	"	"	"	"	"	"	"	23 and over

Three years after the passage of the bill all subsidized ships will be forced to carry crews two-thirds of the members of which are American citizens. In the first year of the subsidy a crew half of citizens will satisfy the regulations, and in the second year all crews must be six-tenths American. Aliens not eligible for citizenship are excluded entirely. All subsidized ships must, of course, be United States owned, and their owners and all persons or companies affiliated with them may not run more than 25% of all their vessels under foreign flags.

Board Can Increase Subsidy

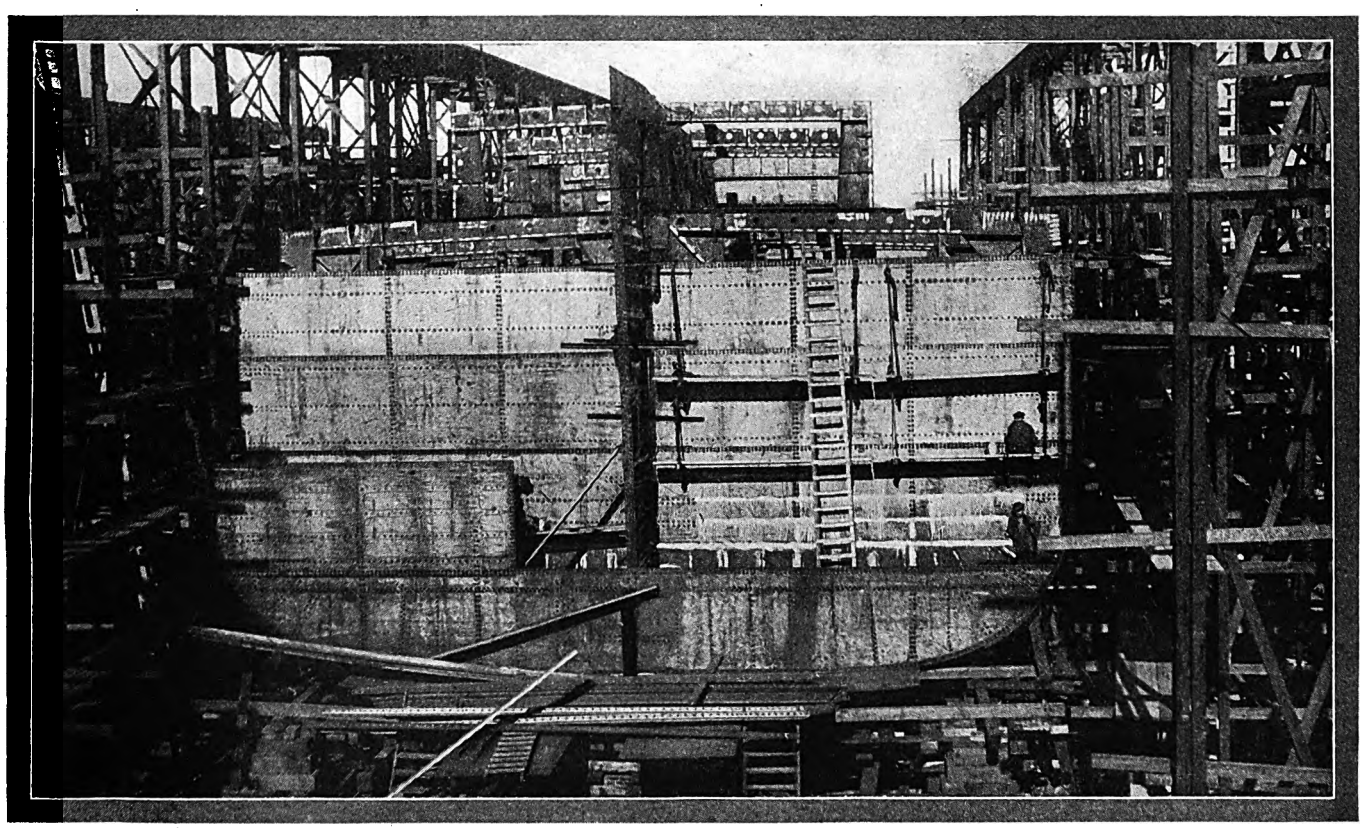


THE board has the power to increase the subsidy beyond the established rates, until the rates are doubled. Subsidized ship operators must pay back to the board half of their profits which exceed 10% of their capitalization. Subsidized vessels may be requisitioned by the Government in case they are needed to meet any national emergency that might arise in the future.

The chief indirect aids offered by the bill to ship operators consist of exemptions from income taxation. In computing his net income for taxation purposes the owner of a vessel of 1,500 gross tons or more will be permitted to deduct a sum which bears the same proportion to his net income, without this deduction, as the gross income of his vessel attributable to voyages to and from foreign ports bears to the total income of the vessel from all sources.

In other words, the larger the shipowner's income for foreign trade, in proportion to his total income, the smaller will be his income tax. This exemption will be permitted for the taxable year 1921 and eight years thereafter.

The money thus withheld from the Government must either be invested immediately in new ships built in American private shipyards, or must be placed in a trust fund for investment in new ships within a reasonable time. The ship-



Cross-section of all-steel cargo ship, showing flat bottom construction to provide maximum carrying capacity.

owners must add to this money an equal amount of their own ordinary funds when they build their new vessels.

Compulsory Passenger Travel



IN addition to these aids, it is provided that half of the immigrants admitted to this country be forced to travel on American ships. All officers of the Government traveling abroad are to use American ships when possible. The Army and Navy transport services are to be discontinued, at the discretion of the President, and the merchant vessels used in their place.

The drafters of the bill did not think that these provisions would be sufficient unless a special inducement were also offered to shippers to dispatch their freight on American vessels. Mr. Lasker, chairman of the Shipping Board, has said that rather than have a ship subsidy he would enforce the provisions of the Merchant Marine Act of 1920, which would levy lighter import duties on goods brought in American bottoms than on freight carried by foreign ships. Both President Wilson and President Harding, however, decided that this provision could not be enforced because it violates our commercial treaties with most of the nations we trade with. Therefore the drafters of the subsidy bill have included a provision to remit to shippers an amount of their income taxes equivalent to 5% of the freight bills they paid to American shipowners during the year.

The bill directs the shipping board to sell as soon as possible the ships it now holds, so that a great American merchant marine may be developed in private hands.

There are two things to consider in forming an opinion on the ship subsidy law:

First, will the subsidy really win us a merchant marine, or will the same economic forces which make our ships idle now continue to keep them idle after the bill is passed?

Second, assuming that a subsidy will get the desired result, is an American merchant marine worth the enormous cost?

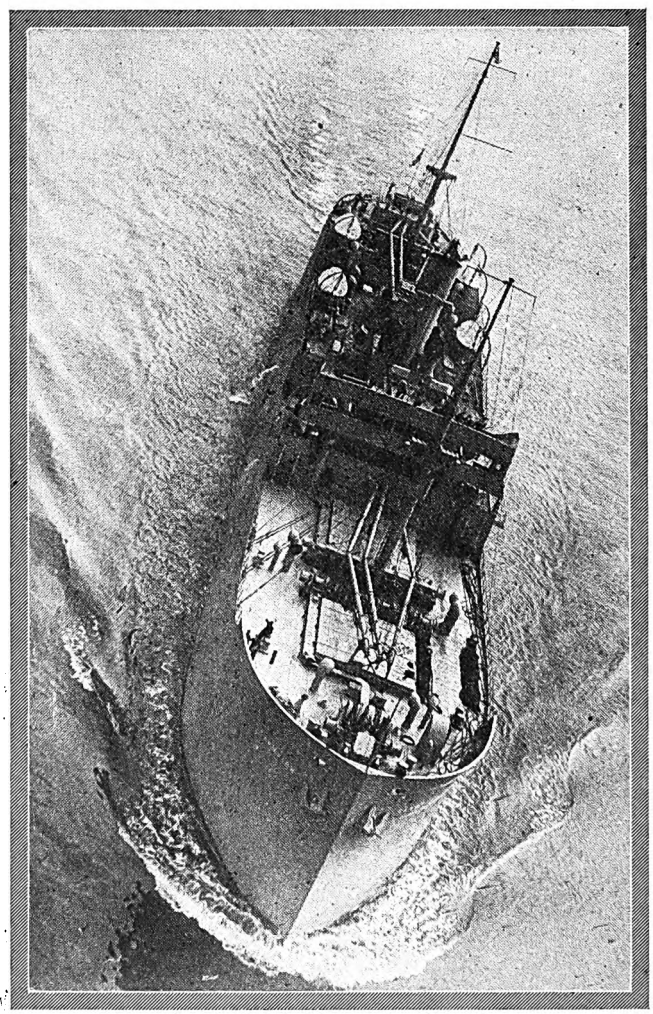
The first of these two questions is one of those problems that the future alone can solve. The experience of the United States with ship subsidies in the past has been far from successful. When steamships first ventured on the ocean we tried to subsidize lines in opposition to Great Britain, and the degree to which we failed was expressed as follows in Congress by Uncle Joe Cannon in 1879:

"Beginning in the year 1847, down to the present time, we have paid out of the Treasury over $21,000,000 for the purpose of establishing steamship lines. Seven million dollars would buy all the steamship lines now engaged in commerce that sail under the American flag, and more than that, the subsidizing of these steamship lines, from the Collins line in 1850 up to the present time, has bankrupted every prominent man who has favored it."

Since Cannon made this remark the United States has spent considerable money, under a law passed in 1891, on subsidies awarded to lines for carrying the United States mails. Up to October, 1920, the American Line received $4 a mile, under the law of 1891, for its service in which 20-knot ships were engaged. This subsidy was intended to help create an American merchant marine: yet until the outbreak of the European War our proportion of the world's shipping did not increase.

England is cited as an example of a power which gained shipping supremacy by means of subsidies. Yet so many other factors contributed to England's success that it is hardly fair to argue that Britain's merchant marine grew great because of subsidies. According to Royal Meeker, in his *History of Shipping Subsidies* (which was published in 1905 by the American Economic Association, and to which those who wish to go more deeply into this question are referred) only 2% of the total tonnage of Britain—and only 6% of that of Germany—in the early 20th century were subsidized. The rest of the ships sailed because it was profitable to sail, and in some cases competing successfully with the subsidized lines.

France and Italy have paid large ship subsidies for many years without thereby developing great merchant navies—yet it must be admitted that without subsidies these countries would have virtually no merchant marines at all, so weak are most of their shipping lines in competition with those of the strong maritime powers. Japan helps her shipping with subsidies; yet all the gain her merchant marine made before the war is inconsiderable compared with the strides which she took, not as a result of subsidies, but as the result of the hostilities in Europe. Her shipbuilding industry gained so greatly during the war that in 1918 she repealed her shipbuilding bounties.

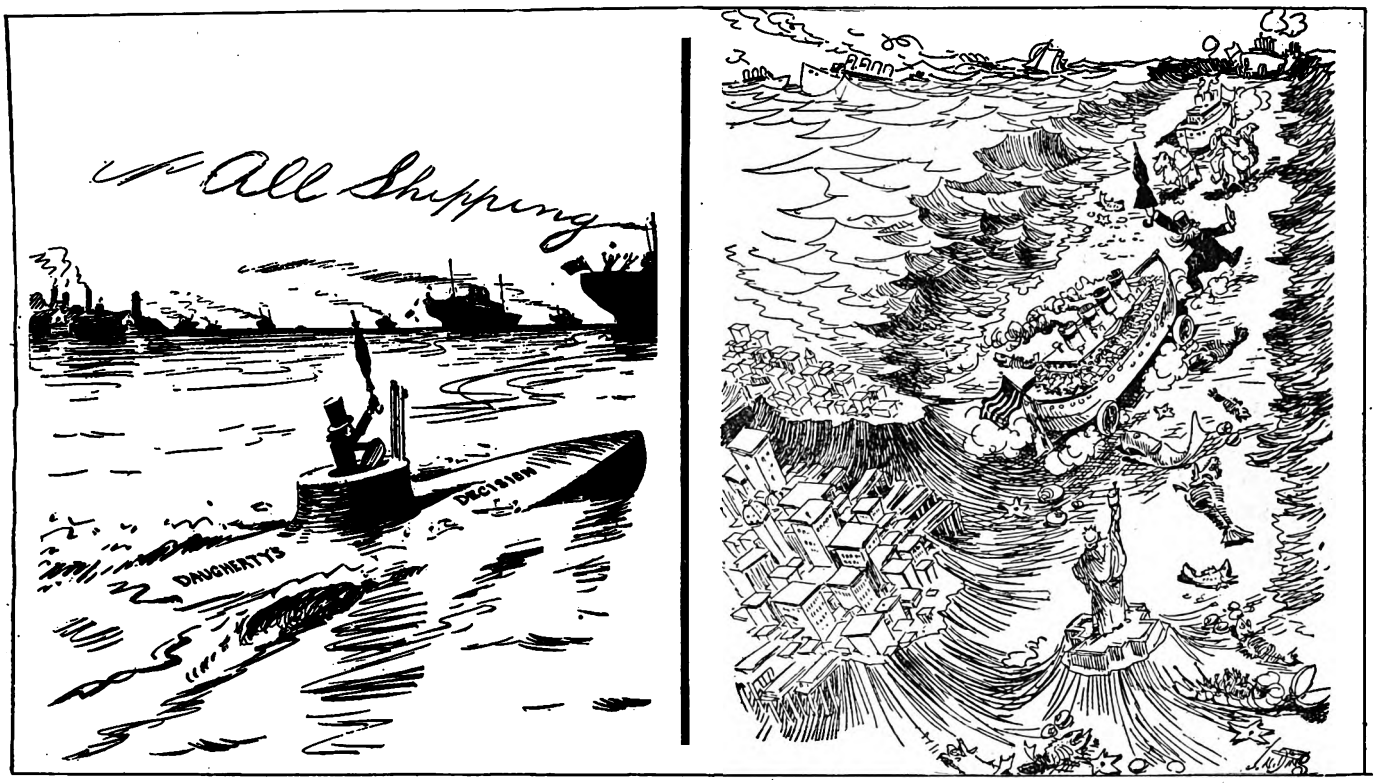


(N. Y. Shipbuilding Corp.)

Gull'seye view of cargo steamer—the efficient non-passenger type commonly used in oceanic and coastwise trade.

These considerations may make us doubtful about the effectiveness of a subsidy. Yet it must be said that without a subsidy our merchant marine is fairly certain to drop quite low. We have already lost many of the maritime advantages we gained during the war, and we are continuing to lose at a faster rate than the European powers. In regard to shipbuilding, a recent report of Lloyd's register showed the following facts:

1. Counting only ships on which work actually is in prog-



(Brooklyn Daily Eagle)
"Dry Law Ueber Alles"

(Tribune Syndicate)
The sea parted and they crossed on dry land.

Cartoonists' Views of the Dry Law Applied to Shipping

ress, the United States is led by England, France and Holland, with Japan and the British Dominions right on the heels of the United States.

2. The United States is now building only 6% of the world's tonnage; England is building 60% and the other maritime nations 34% combined.

3. This country now has only 150,000 tons of ships in the yards; has not contracted for any new ones since last July 1, and has largely suspended work on those already on the ways.

4. America's decline since the post-armistice peak of vessel construction has been 4,036,000 tons—a goodly percentage of the decline for all the world, which aggregates only 5,346,000 tons.

5. Her shipyards are building only one-third as much tonnage as they were a year ago. Great Britain's are building one-half.

6. America is building today only 2,000 tons more of freight bottoms than she was at the outbreak of the World War in July, 1914; all other nations, taking into account the wholesale suspension of building, during the last three months, aggregate 919,000 tons above the pre-war construction totals: Great Britain is building 1,200,000 tons compared with 1,750,000 she had under way in July, 1914.

The advocates of the subsidy can see no reason for doubting that the measure will put plenty of American ships on the seas. Mr. Lasker told the joint congressional committee that if the measure were enacted a privately owned American merchant fleet of 7,500,000 tons would be afloat in a short time. This tonnage would include such of the present idle Shipping Board tonnage as is fit for use. Mr. Lasker said that the subsidy will relieve the treasury entirely of the $50,000,000-a-year burden which the Shipping Board fleet now imposes.

Assuming that a subsidy can put an American merchant fleet on the seas, will the result be worth the price?

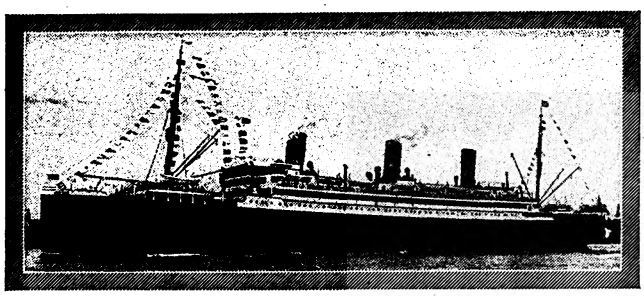
It is hard to see just what great advantage America would gain, in time of peace, by having her trade carried in ships which fly her own flag rather than the ensign of a foreign power. From the strictly economic point of view, a shipping subsidy is hard to justify. It is argued that we damage ourselves by paying money to foreigners to carry out freight; but, as Royal Meeker says, "if we pay Englishmen, Germans and Norwegians ever so many millions of dollars for doing services which would cost us a great deal more if we performed them ourselves, there is nothing by economic gain to us in the transaction." Obviously it does cost us more to do our overseas transportation ourselves than to have foreigners do it for us; otherwise there would be no need for a subsidy. Manufacturers and exporters are interested in getting the cheapest and best transportation. Why should they contribute to a fund of $40,000,000 a year for American ships when they can have their goods transported just as effectively in ships that happen to be owned by foreigners? If our capital is not as efficient as foreign capital when invested in ships, it is better, from the purely economic point of view, to leave the ships to foreign capital and put our own money into something that we can do better and more profitably.

How Foreign Nations Do It



IT is said, in partial reply to this, that foreign ship lines run their vessels so as to favor traders of their own country. Specific instances of this are lacking. It is not unfair to assume that, for the most part, foreign ship lines give service to those who pay for it, regardless of nationality. They could not compete long on any other basis. Perhaps favoritism is sometimes shown, but the burden of proof is upon those who contend that it is considerable.

The strongest argument of the advocates of an American

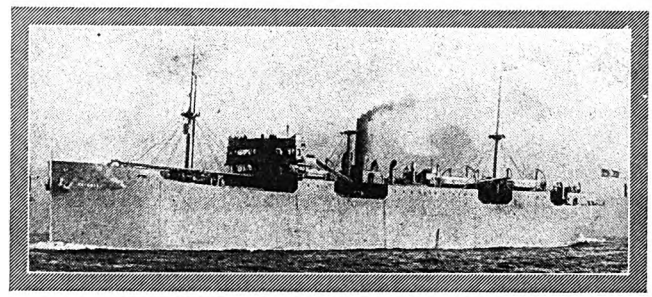


(Morse Dry Dock & Repair Co.)

The six types of ships illustrated on this and the next page are the strongest links in the international chain which is to establish a better world-wide economic era. Above is an "ocean greyhound" passenger ship.

merchant marine is not economic, but military. Like the proponents of a dye embargo, they point out that the era of wars is not over, and ask if in time of war we wish to be dependent upon a foreigner—perhaps an unfriendly nationality—for our overseas transportation. The case for a ship subsidy as a measure of preparedness for war is far stronger than any case which could be made out for it as a purely business measure.

Homer L. Ferguson, president of the Newport News Shipbuilding and Drydock Co., told the joint Congressional committee that a ship subsidy law is absolutely essential to the maintenance of an American merchant marine able to care for American commerce in time of peace and of sufficient size to provide an auxiliary fleet such as the navy would require in the event of an emergency. Preparedness for war, in his opinion, is one of the chief purposes of the subsidy.



(N. Y. Shipbuilding Corp.)

The modern ocean freighter built since the war and now accepted as the best type.

"In time of war," said Mr. Ferguson, "an efficient merchant marine is as necessary as an efficient fighting navy. Without such a merchant marine the safety of our country might easily be imperilled.

"While world sentiment is strong against war, there is no assurance that it will not recur at times and in regions that cannot be predicted very far in advance. Should war come, we should need a very large number of auxiliary vessels with our fleet, and a still larger number of supply vessels to serve the fleet.

"There would be no time to build these vessels after diplomatic relations had been broken, nor would there be opportunity to purchase or charter them from abroad. The only course open from the standpoint of national safety is to have these vessels form a part of our permanent merchant marine.

"As the number of war vessels is to be restricted, the importance of a merchant marine as an auxiliary to the war fleet is correspondingly enhanced. Should war fleets be abolished altogether, the sea would be definitely in the control of those powers having the largest and best equipped merchant fleets. Heretofore the American naval fleet has existed without a corresponding merchant fleet, which has generally been held as necessary to a strong navy. Great Britain and the United States agree that their naval fleets should equal each other in strength. It does not, however, follow that their war strength on the sea will be equal, because that country possessing the best merchant shipping inevitably will have a tremendous advantage.

"A merchant fleet is always a potential war fleet, and forms, both in its equipment and men, a naval reserve, whether called that or not. To neglect merchant shipping while limiting war vessels is deliberately to invite disaster.

"On Jan. 1 the average hourly wage in British yards at the then rate of exchange was 31 cents. In American yards the corresponding figure was 58 cents. The relative efficiency of labor was considered somewhat higher in American yards than in British yards, although, owing to the greater stagnation of shipbuilding in this country, due to the enormous surplus of the Shipping Board's construction, this slight superiority, if it exists at all, cannot long be maintained. On the other hand, the cost of materials and equipment for cargo vessels construction in American yards was not appreciably different from the cost in British yards, and this equality will probably not be greatly changed in the future.

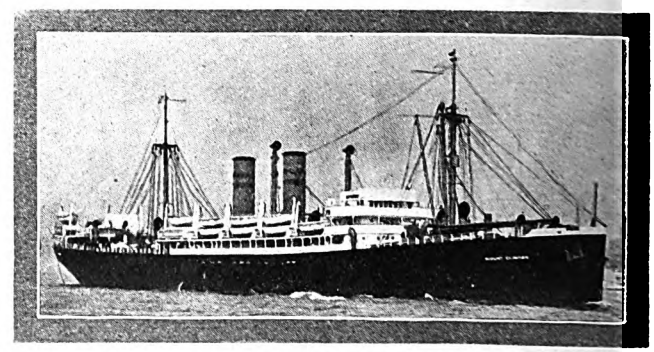
"With the dearth of naval construction, on which American yards have in the past largely depended, and with the very large amount of excess cargo tonnage already in existence under the American flag, American yards look forward to a period of acute depression, relieved only by the construction of the higher type passenger or passenger-cargo vessels, if such is made possible by Government aid.

"To a limited degree such a period of depression will tend to bring about low prices in American yards, due to their efforts to keep their organization employed and to carry their overhead. This cannot last indefinitely, however, and a yard which cannot derive a reasonable profit from its work will have no alternative but to close its gates. In the long run infrequency of construction will tend to increase costs here, owing to the smaller number of ships among which the overhead can be divided.

"It seems incontestable that in the future, whatever the immediate situation may be, we cannot look for a closer approach of our shipbuilding prices to those of British yards than the governing disparity in wages will permit. This disparity will probably be not less than 45% of the American wages."

Henry J. Allen, governor of Kansas, believes in the subsidy bill on economic as well as patriotic grounds. He says:

"The establishment of the American merchant marine is an element of transportation and is vital, in my opinion, to the continued economic welfare of the agricultural States. World conditions now make the sale of goods in competitive foreign markets more difficult than ever. The American farmer, miner, merchant and mechanic cannot compete in selling their excess products abroad unless we have our own delivery system, owned and operated by Americans.



(Morse Dry Dock & Repair Co.)

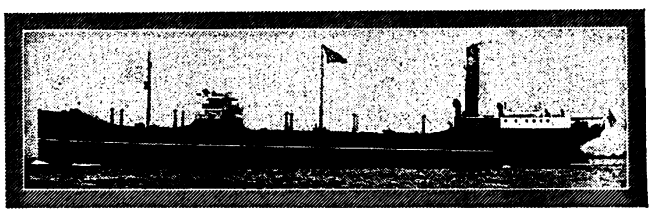
Moderate size passenger and cargo steamer engaged in trade between New York and Hamburg.

"I believe that the only practical way of establishing the merchant marine is to pass the pending shipping bill which provides an encouragement of from one-half to two and six-tenth cents per ton, per hundred miles, based on speed and distance. The bill also preserves the established trade routes and gives ample protection to the Mississippi Valley, in its ability to acquire at its respective ports, the necessary ships from the government, in order that private operators who understand their business may take care of the commerce of the Valley.

"The creation of a permanent merchant marine by means of this act will furnish additional employment to over one hundred thousand Americans on board ships and in shipyards, the steel mills, the iron mines and in many other industries which are necessary to build and operate ships for foreign trade. Every man thus employed must be well fed and the American Farmer will be benefited by raising and selling foods to them and their families.

"I believe thoughtful men realize the benefit and advantage from the merchant marine. The wheat of Kansas and of other upper Valley States; the corn and corn products and livestock, and meat products; the output of industrial institutions entering foreign trade, must find orderly processes of transportation if a reasonable measure of prosperity is to come to this section.

"Foreign trade has already interested this great producing section of the country, not in any spirit of romance or artistry, but as a practical business transaction for the disposal of our domestic over - consumption. The legislation now before Congress giving assistance to the shipowners and operators of the country and providing for the disposal of the ships now operated by the United States Shipping Board, will prove valuable to all producers of agricultural and manufactured goods. In Kansas and other farming States, continued prosperity must come from new markets for agricultural products and lowered transportation costs to those markets. Foreign trade is the answer to the question of new markets.

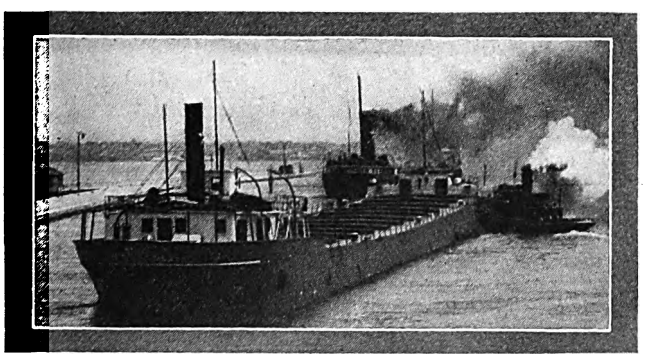


(N. Y. Shipbuilding Corp.)

The collier with its familiar rear-end quarters and absence of superstructure

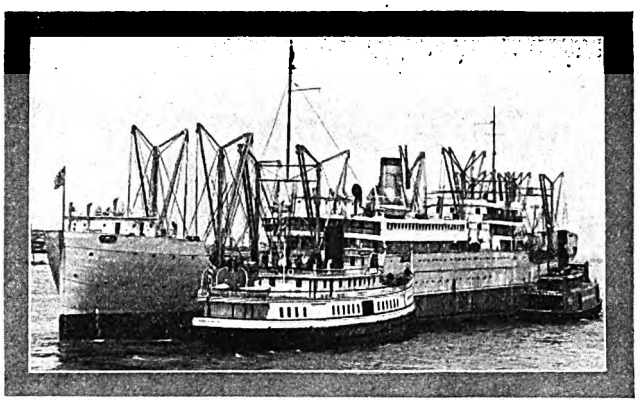
"I have given reasonable study to the transportation question. I believe merchant marine is part of it. I believe the shipping bill is the only way of getting a merchant marine. I believe our people, the more they study the question, are inclined to feel the same way about it.

"Our rivals for the world's trade view with great alarm the prospects of the passage of the bill and their representatives are spreading insidious propaganda and doing their utmost to defeat the measure. This is the strongest evidence possible why the bill will benefit America and why it should receive the support of patriotic Americans."



(© Galloway)

A familiar sight on the Great Lakes and St. Lawrence waterway—the ore ship from Western mines to mills and factories in the East.



(© Galloway)

New American ship with limited passenger capacity and up-to-the-minute freight-handling machinery.

Many of the debaters on the other side combine their attacks on the bill with verbal assaults on the shipping interests. Philip Manson, president of the Pacific and Eastern Steamship Co., told the Congressional investigators that the subsidy not only would fail to create a merchant marine but would seriously retard its development.

"All that subsidies will do," Mr. Manson said, "will be to increase and perpetuate the dishonesty and inefficiency that pervades American shipping and add to the private fortunes of ship owners without benefiting the people an iota. When ultimately the taxpayers refuse to continue to enrich a few ship owners the American merchant marine will be in a worse state than ever before."

During the last three and a half years, the witness asserted, the Government has given to American shipping interests a "subsidy so vast that even the most brazen subsidist would not have dared to ask for it.

"There was turned over to American shipping interests, free of all costs to them, a fleet of over 1,500 vessels, including some of the finest passenger ships afloat. Not only have American shipping interests had the free use of this fleet of ships which cost the American people over $4,000,000,000, but they received in addition from the Government hundreds of millions of dollars in cash to cover alleged losses in the operation of ships notwithstanding that during much of the period during which they have had these ships high freight rates have prevailed and large profits could easily have been earned.

"Not only has this vast subsidy to American shipping interests failed to create a permanent American merchant marine, but it has fastened upon American shipping a curse of incompetence and graft which it will take many years to eradicate."

Representative Edwin L. David, of Tennessee, in an interview with Harold Phelps Stokes, of the *New York Evening Post,* declared that the bill would give entirely too much power to the Shipping Board.

"The pending ship subsidy bill confers the most autocratic power and the widest discretion perhaps ever conferred upon any board," says Mr. Davis. "It affords boundless opportunities for favoritism, graft, and corruption. Under its provisions the Shipping Board is authorized to usurp powers

(Turn to page 1860)

That Mysterious "Living Wage"

Is there such a thing?—why the Labor Board refused to set a standard that it claims cannot exist

THE United States Railway Labor Board has created a stir by declaring that the phrase "living wage" is nothing more than "a bit of mellifluous phraseology, well calculated to deceive the unthinking." This pronunciamento has had disturbing effects in two directions: First, it has stimulated the enemies of the Labor Board to new attacks and declarations that the Board doesn't know what it is talking about; and second, it has excited comment and argument on the part of those who are interested in the economic theory that the words "living wage" imply.

The Board's attack on "living wage" was embodied in a majority opinion which was offered in reply to a dissenting opinion presented by A. C. Wharton, labor member of the Board, after the majority of the Board had refused to grant a minimum wage of 48 cents an hour to maintenance-of-way employes. The petitions of the maintenance men had been based on the "living wage" theory. The Board, in its majority opinion, said that this theory, "if carried to its legitimate conclusion, would wreck every railroad in the United States, and if extended to other industries, would carry them into communistic ruin."

"If the contentions were that the Board should establish a 'living wage' the majority would readily accede to the proposition," the opinion said, "and as a matter of fact, the Board in this instance as in all others has granted a living wage. But the abstract, elusive thing called 'the living wage,' confessedly based upon a makeshift and a guess, cannot receive the sanction of this Board, because it would be utterly impractical and would not be 'just and reasonable,' as the law demands."

Attacking the budget method of determining what should be a living wage, the opinion says:

"That it would be wise and practical to undertake to establish an arbitrary standard of living for several millions of persons is not apparent. That the desires and requirements of all men are equal and alike is not correct, and that any committee of experts could set up an average living standard upon which a wage scale could be practically based has not been demonstrated anywhere.

"That standards of living are gradually improving in this country is undoubtedly true, and this is as it should be. There is no member of the Labor Board who does not profoundly desire improved living conditions for common labor, but it is our belief that this movement must be continued along lines indicated by human experience, and that it cannot be consummated in the twinkling of an eye by artificial expedients."

Asserting that experts testifying for the maintenance of way organization admitted that immediate establishment of "the living wage" would "throw a monkey wrench into industrial machinery," and that the Board, therefore, make only a start in that direction at present the opinion said:

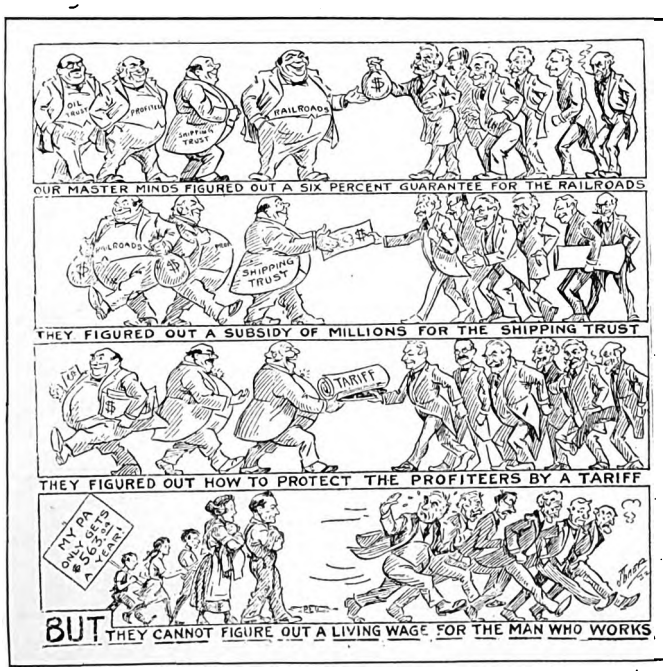
An Illogical Proposition

"SUCH a proposition is entirely illogical. If the living wage is the just and reasonable wage authorized by the statute it is the duty of the Labor Board to establish it now. If it is not the just and reasonable wage commanded by law, then it is not the duty of the Labor Board to adopt it now or hereafter, unless the law be changed."

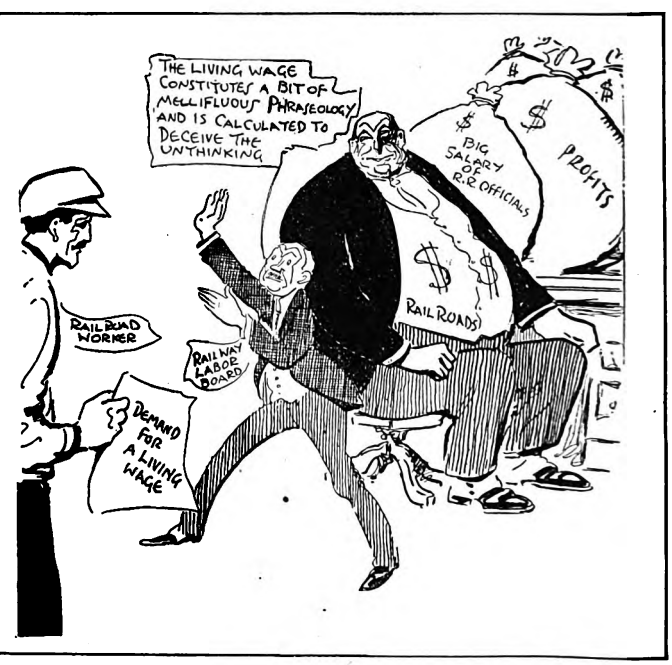
Adoption of a family of five with one wage earner as a basis for computing a living wage also was attacked in the opinion, which asserted that the last census showed there were 4.4 persons in the average family, but 1.4 dependent children instead of the three that the experts before the Board took as a basis, and that there were 1,360 workers instead of one in the family.

Commenting upon government ownership if the living wage principle were established the opinion said:

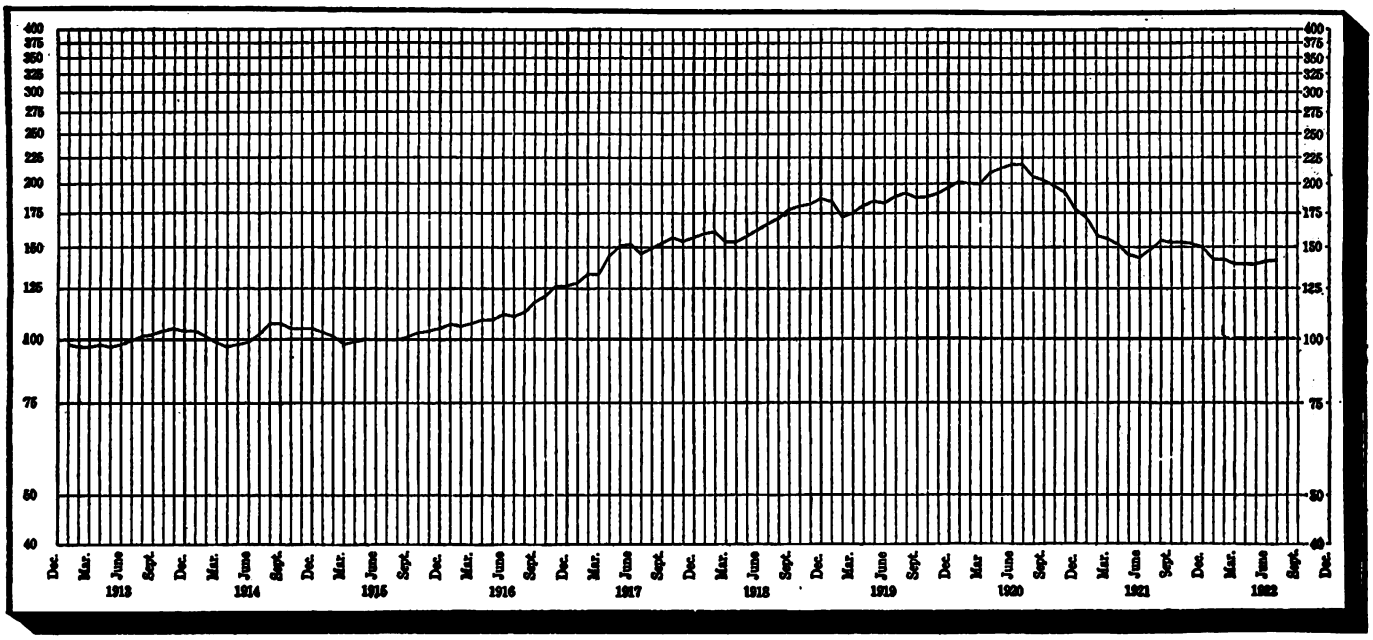
"Of course, for those who desire government ownership this would be a quick method of getting it, for it is a sure thing that the public would not stand for the imposition of



(New York Call)
Living wages for the profiteers.



(New York Call)
The Wage Board passes on the living wage.



(U. S. Bureau of Census)

Trend in the retail cost of all articles of food, combined, for the United States, by months, January, 1913, to July, 1922. (Average cost for 1913—100.)

higher rates to pay such a deficit." It asserted that in the last analysis the public would pay for the increased wages and that most of it would come from workers in other industries."

The Other Side of the Case

THE other side of the case is presented in Mr. Wharton's dissenting opinion, which called forth the Board pronunciamento. Mr. Wharton says:

"The submissions filed by the employes in this dispute were supplemented by the representative of the employes by the filing of a formal motion reading:

"We wish formally to request that the living wage principle be accepted by the board and made the basis of its action in the present case. We make this request as a formal motion, and ask the board to take it under consideration and give us a formal ruling before we proceed further with the case.

"1. That the Board recognize the living wage as the basis of the decision in this case.

"2. That in applying this principle, a minimum rate of not less than 48 cents an hour be awarded to all of our members, who, under your last wage decision No. 1028 (Docket 1300), are receiving 28 cents an hour or less.

"3. That for those who are now receiving more than 28 cents an hour their differential in cents above 28 cents be added to the new minimum rate of 48 cents an hour.

"The decision of the majority in this case is fundamentally unsound and unacceptable on the same grounds which were set forth in the dissenting opinion of the minority in decision No. 1028. At that time the views of the minority were developed in great detail, and are applicable to the case under discussion. They may be briefly summarized by the following excerpt from the dissenting opinion to decision No. 1028:

"(1) The rates of pay established under this decision as the basic minimum rates of the transportation industry will merely perpetuate the low level of purchasing power possessed by this large class of workers in pre-war years. * * *

"(2) The rates of pay established under this decision will mean annual earnings far below any minimum standard of subsistence which has been formulated, even below those of most conservative employer groups.

"(3) The rates of pay established under this decision are not based upon the human needs of the hundreds of thousands of families involved. They are insufficient to provide these families with the absolute essentials. The earnings of this large group of railroad employes will not provide the father of a family with as much food as is allowed convicts in the Cook County, Illinois, jail.

"(4) The pre-war standard perpetuated by this decision was the product of inequitable wage bargains. It is considerably below the level recognized at that time as necessary for the maintenance of health and energy."

"An inadequate wage is unjust and unreasonable.

"The fundamental error of the majority rests upon their refusal to inquire into the adequacy of the rates of pay established for section men and unskilled laborers. Although these rates may be placed on a higher level than those paid by private industries this does not meet the requirements imposed on the Labor Board by the Transportation act.

Just and Reasonable Wages

"THE specific and fundamental mandate of the law is that wages shall be just and reasonable. The relation of rates of pay to those established in private industry, or the relation of rates of pay to the cost of living, is a *secondary* consideration which does not come into play until the *primary* requirements of a "just and reasonable" or an adequate or living wage has been satisfied.

"Under these duties of the Board it is manifest that the rates of pay of unskilled workers, or those at the bottom of the wage structure, must first be established on an adequate basis—a basis sufficient to maintain and perpetuate in a reasonably comfortable and decent way the unskilled worker and his family—and after this has been done just and reasonable differentials above this basic wage for unskilled labor must be established in connection with skill, experience, productiveness, hazard, training, etc. In other words, in connection with seven relevant circumstances specifically mentioned in Section 307, as well as others unenumerated but covered by Section 301 of the Transportation act."

In labor circles the Board was violently attacked for its "living wage" opinion. Samuel Gompers expressed extreme disapproval. The *New York Call,* a Socialist organ, was quite violent, saying:

"The decision is the most illuminating one that has come from a governmental body in a generation. It is the more interesting because it arises out of conflicts in the railroad industry. It is an industry that has a history of graft, bribery, wizard finance, swindling of small stockholders and loading

up with enormous quantities of 'water.' The roads are paying dividends on enormous fictitious values. After being plundered by the railroad gamblers, the same plunderers now are able to obtain a decision from a Government board that is shocking in all its implications.

"It means that our great overlords of industry have reached a point in their ruthless mastery where they think the time opportune to proclaim a slave standard for the workers of the nation. Even the masters of the great plantations sought to insure the slave a standard that would not endanger his health or life. Money was invested in him and this served to check the greed of many masters.

"But wage labor is today bought by the day, the week or the month. Its purchase carries with it no responsibility for the health of the worker. The labor market is well stocked and when health or life is ruined the masters know that they can enter the market for more living material to be used as merchandise and to be treated as such.

"In the twenty-second year of the twentieth century we have this decree of a Government body that an income sufficient for a human being to live on and rear his family is 'a bit of mellifluous phraseology.' Stark reaction and sodden greed could not possibly go farther than this. It is a kick in the face of every workingman and woman. It should cause a great political revolt."

What Business Men Think

NEWSPAPERS which look at things from the viewpoint of business men, however, found much to approve in the Board's condemnation of the theory. The *New York Commercial,* in an editorial supporting the Board, playfully asks what would be a living wage for Samuel Gompers:

"It is bound to come to a focus sooner or later, this demand for a living wage. The Labor Board declares it is an abstraction, a phrase, and it is right. And Mr. Gompers rages some more and demands the immediate abolition of the Labor Board. Perhaps Mr. Gompers can tell us what a living wage is. Mr. Gompers is, or was, a cigarmaker before he developed the gift of oratory. Now, if some outside body were to determine what is a living wage for Mr. Gompers, would it consider him as a cigarmaker or as an orator?.

"Let us for the moment consider him as a cigarmaker. If he were employed at Tampa, Fla., or Key West, where living is cheap, and where man wants but little, that is to keep soul and body together, he could probably live very comfortably on $2 a day. There would be no coal bills, no high rents, no winter clothes to buy, and only the movies once in a while for amusement. That he would be satisfied with $2 a day does not follow. Let us suppose he moved to New York and lived over on the East Side. Rents would be high, his winter coal would have to be thought of, and he would have to consider winter clothing, car fares and a dozen other items not considered in Florida. He could possibly get along on $5 a day. He'd want more, of course, but, still, he could live on that.

"Now, let us suppose there was a national board with power to decree what a living wage should be for all cigarmakers. Mr. Gompers, of New York, getting $5 a day wouldn't look at all well to Mr. Gompers, of Florida, and he, too, would demand $5. But the Florida Gompers would have a margin of 60% over the New York Gompers, which the latter would not like, and would, thereupon, demand an advance to $8.33, so that he could have a 60% margin, and then the Florida Gompers would want $8.33 because—well, there you are!

But suppose we stick to New York. One Mr. Gompers is a bachelor and another is married and has five children. The bachelor can get along on $5 a day, but the family man cannot. A living wage, then, must include enough to support a man's family, and the wage is increased to $10 a day. The bachelor Gompers gets all the benefits of having a family without the care and responsibility of it, which the married Gompers does not fancy, and so the Labor Board fixes a wage scale of $8 for single men and $10 for married men; employers immediately discriminate in favor of single men and fire them when they get married. Hence married men are out of work and something will have to be done about it. Just what, only Mr. Gompers can suggest.

"We now come to Mr. Gompers as an orator. Eight, or even $10, a day would never do for that sort of work. It requires a different type of mind and temperament to be an orator. A cigarmaker may be an orator and an orator may be a cigarmaker, but not every cigarmaker is an orator, while some orators can make nothing but noise and may even forget how to make cigars. When a cigarmaker becomes an orator his ideas as to what is a living wage undergo a change. He cannot live at a hotel and employ a private secretary, and travel and do all the other things orators do, on the wages of a cigarmaker. The national board that fixes a living wage will have to adopt a different standard, possibly the British thermal unit, in determining what is a living wage for orators.

"Yet, considering the subject seriously, how can any board determine a living wage that can be just and reasonable that will fit all parts of the country without the inequalities suggested above? Such a board must arbitrarily set the standard of living for that particular group. The earnings of the slowest will equal those of the quickest, and the labor of the quickest will slow down to that of the slowest. Will the mode of living of an ambitious family be taken as a standard or that of a slacker family? What are to be included in that standard?

"Before there can be a standard of living there will have to be a standard family selected, residing in a standard neighborhood, and who hath the wisdom to define such standards? The Labor Board disclaims it forthwith."

In Support of the Labor Board

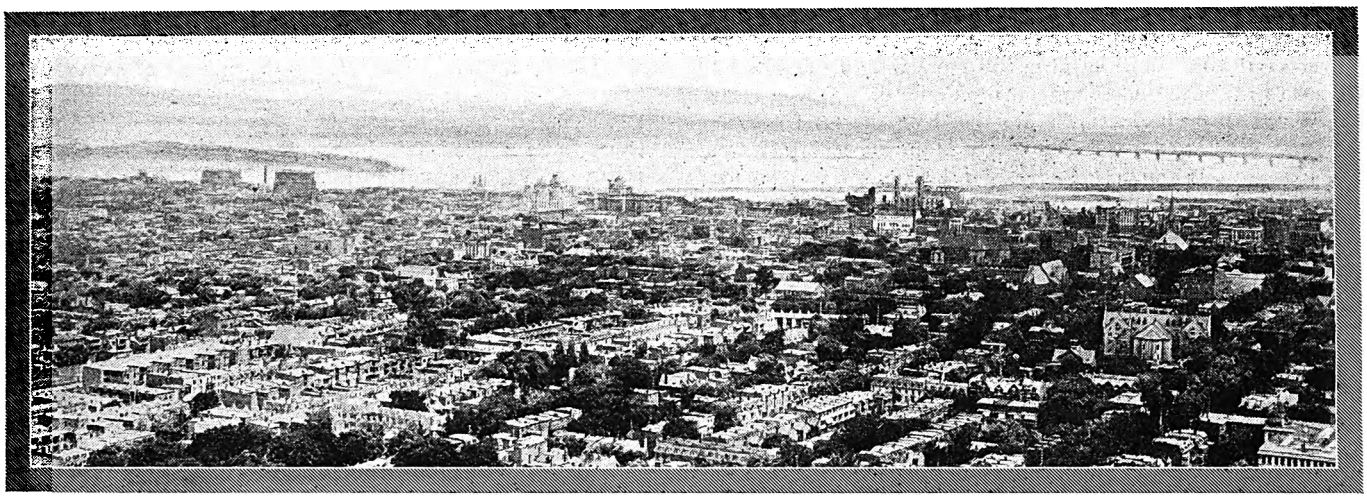
DOES the condemnation of the "living wage" theory imply the belief that workers need not be paid enough to live on? The *New York Herald* attempts to answer that question as follows:

"Every rational human being in this country stands for a wage that will give American workers an American living. But the United States Railroad Labor Board is right in holding that the so-called "living wage" does not mean what those who advance the theory in wage-scale disputes pretend it means.

"As for the living wage in its true sense, it is a self-evident fact that when there is employment for all, with a growing demand for labor commensurate with the growing operation of industry and business, there must be a high enough wage for workers in a given community and in a given industry to care for them or the workers there will shift to another community to obtain what is waiting for them there.

"But it is equally a self-evident fact that what is a 'living wage' in one part of the country could not be such a living wage, might not even approximate such a living wage, in another part of the country where rents, coal and light were half again as high as in the first instance, where food was dearer, where there was a substantial transportation cost of getting to and from work as against none at all in the first instance, where clothing expense was greater because of climatic severities, etc.

"And in particular nothing worse ever happened to the railroad workers as a whole than the irrational application of a uniform rate of pay based on a false living-wage theory at the time of Government operation of the roads, when all members in a class of workers were put on the same wage level, no matter in what part of the country they were working, no matter how much or how little of their strength and effort was required for their actual railroad work."



Montreal on the St. Lawrence River—the largest inland port in the world. Rapid development of the port promises to make it a competitor of New York.

Montreal—a Promising Entrant in the Shipping Sweepstakes

Canada is backing the St. Lawrence port in the international race for commerce—with a fair chance of success

ONE of the interesting romances of modern commerce is being enacted at the ancient and picturesque city of Montreal. Quietly and unassuming, this inland harbor is creeping up past more-advertised ports, whose business is dwindling. If it continues its present rate of development, its proponents think, it may become the first port of the Western Hemisphere.

Montreal is a port for ocean-going vessels, 300 miles nearer Liverpool than New York. With her modern facilities, the St. Lawrence port avoids the congested and antiquated methods of transfer which hamper the development and efficiency of New York, and Montreal possesses a geographical location for trade and commerce unequalled in the Americas.

Montreal is the largest and most populous Canadian city, ranks fifth in size and population among the cities of the American continent, has the largest inland port in the world, is the seventh in importance among world ports, and in the Western Hemisphere takes second place only to New York.

The closing of the port of Montreal with the termination of navigation in 1921 brought to a conclusion the most remarkable season in the export history of that port, while the business of 1922 has been even greater. Shipments of agricultural produce, not only of Canadian but also of United States origin, exceeded by a wide margin all previous records, taxing the large capacity of the harbor to the limit and creating a scene of unprecedented activity. Proponents of the Canadian port say that this development is not brought about by purely temporary conditions, but is occasioned by circumstances which should assure an even greater volume of business in the future.

An illustration of the growing importance of the northern port in world commercial affairs is shown by the fact that from May 1 to December 1, 1921, grain arriving at Montreal for export totalled 140,036,445 bushels, a volume in excess of all other Atlantic ports, including the port of New York. The 1922 volume of trade has been even greater.

A surprising feature of this enormous volume of business has been the increased traffic from the United States for export through the St. Lawrence port, wheat increasing from 11,500,000 bushels in 1920, to 27,500,000 bushels in 1921, and corn from 85,816 bushels in 1920 to 25,178,581 bushels in 1921.

The chief cause of this movement was the United States tariff which virtually cut off the export of Canadian agricultural produce by way of the border, as formerly, and diverted the voluminous products of Western sections to the Atlantic for shipment overseas. It will be appreciated that the American railways and shipping lines have, because of this legislation, not only lost the major portion of Canada's export business, but also have lost a large part of their United States business, since better rates prevail through Montreal to world ports than through United States ports.

"Rail meets sail" at Montreal, as will be seen from the fact that, of the May to December, 1921, volume of grain, 64,559,360 bushels arrived by lake steamers and 75,557,069 bushels by rail. The total export of all kinds of grain from Montreal in the 1921 season was 119,602,189 bushels. The significance of this figure can be realized when it is compared with the previous year's total of 53,143,305; the previous record of the port was made in 1914, when 75,361,829 bushels passed through. Though wheat showed a substantial increase the most remarkable development was in corn, which jumped from shipments of about 500,000 bushels in 1920 to more than 43,000,000 bushels in 1921.

The shipment of cattle to the overseas market did not open aggressively until late in the season, and yet in the course of seven months of open navigation, 35,000 head left for Liverpool and Glasgow. Shipments via the St. Lawrence route in previous years have been negligible.

Montreal's Port Future

THERE are other developments, assured and projected, in the port of Montreal, deeply significant of the general appreciation of the importance of its future. Many shipping companies have obtained rights in the harbor. Some 20 additional steamship companies, doing a trans-Atlantic passenger and freight business, are using Montreal as their Western terminal

in Atlantic traffic. The number of cargo vessels using the port has increased proportionately. Already the St. Lawrence River carries to and from Montreal more than a third of all Canada's national trade, the annual volume of which exceeds $1,000,000,000. The prospects are that both the total volume and the proportion passing through Montreal will increase.

Naturally this wonderful growth in business has called for extensive increases in the capacity of the harbor. Development is now a continuous work, progressing unceasingly each season. Montreal harbor today provides more than 100 steamship berths from 350 to 750 feet in length, with a depth of water of from 25 to 35 feet. The berths, and the improvements that go with them, have been built at a cost of $30,000,000.

There are two large grain elevators at which nine vessels can be loaded simultaneously, 60 miles of harbor railway, and a total wharfage of more than 12 miles. To meet the increasing demand for grain handling facilities, the harbor commissioners are now working on plans for a grain elevator of 10,000,000-bushels capacity, which will be the most capacious in the world, outstretching by 500,000 bushels the present record elevator at Port Arthur, head of the Great Lakes. Montreal now has trade relations with every country of the globe. A dozen of the leading shipping lines have headquarters at this port, and a score have their American branches here.—

E. W. G.

Wanted: Waste Paper

The book, board, cardboard and binders' board mills are faced with a shortage of material

ONE of the problems that confronts the paper industry today is the shortage of waste paper. The book, board, binders' board and cardboard mills have been looking for waste paper for some time, and according to Dr. Hugh P. Baker, executive secretary of the American Paper and Pulp Association, there has been no relief in the shortage.

"The difficulty is in part the fact that the high cost of collection and transportation leaves a small margin for the junk collectors to pay the housewife," says Dr. Baker. "In case the shortage were to continue indefinitely, it would be necessary for the paper industry to take some means of assuring itself of a regular and adequate supply of waste paper, possibly by independent organization of paper collection agencies, which has already been suggested in some quarters."

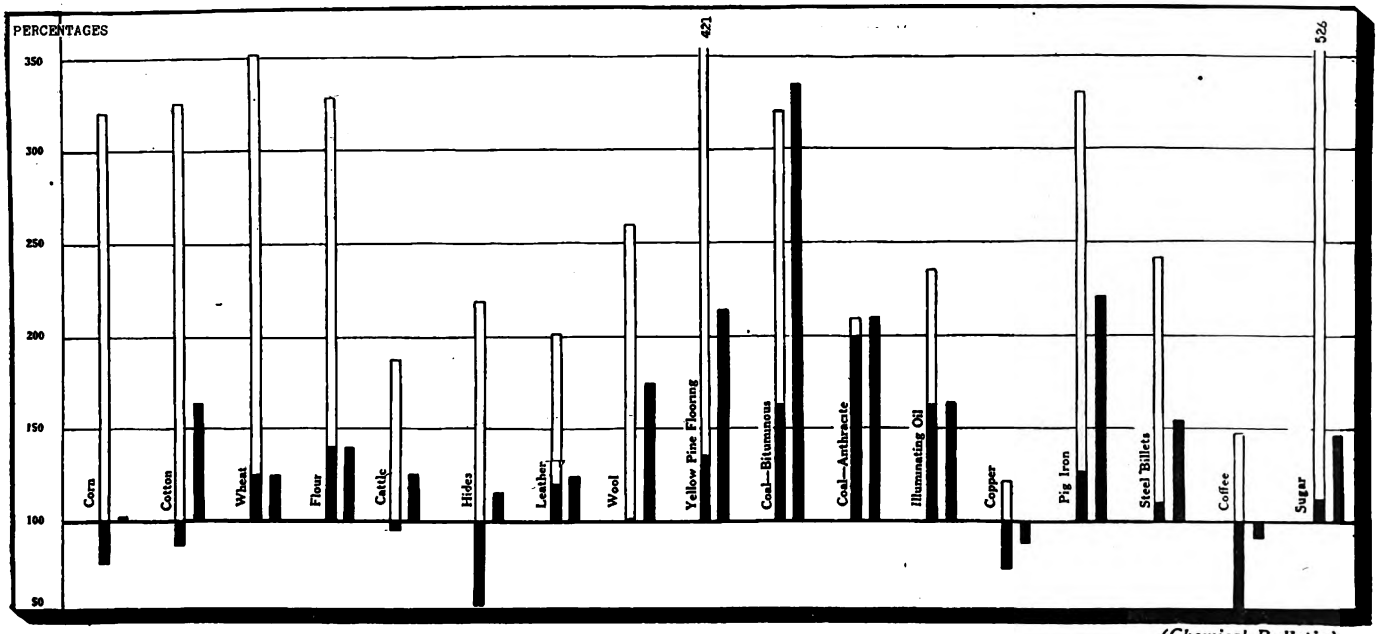
Ingenious methods of increasing the amount of waste paper collected have been adopted. In Chicago a local dealer held a unique school children's campaign for the collection of paper to be worked over by the paper mills of this city, one feature of which was the awarding of a $20 prize to the boy who collected the largest amount of paper in a week. This boy collected 5000 pounds, which meant that with his prize money he earned a handsome sum for his week's work, for paper mills are now paying as high as $35 a ton for folded newspapers, and considerably more for the magazine and better grades. The result was the collection of more paper than has been collected in that city in the preceding six months. Even so, the total collected was only enough to supply the mills of the locality for five hours.

Tar for Surfacing Roads

Mineral-oil products are fast being replaced by tar and tar products in highway work

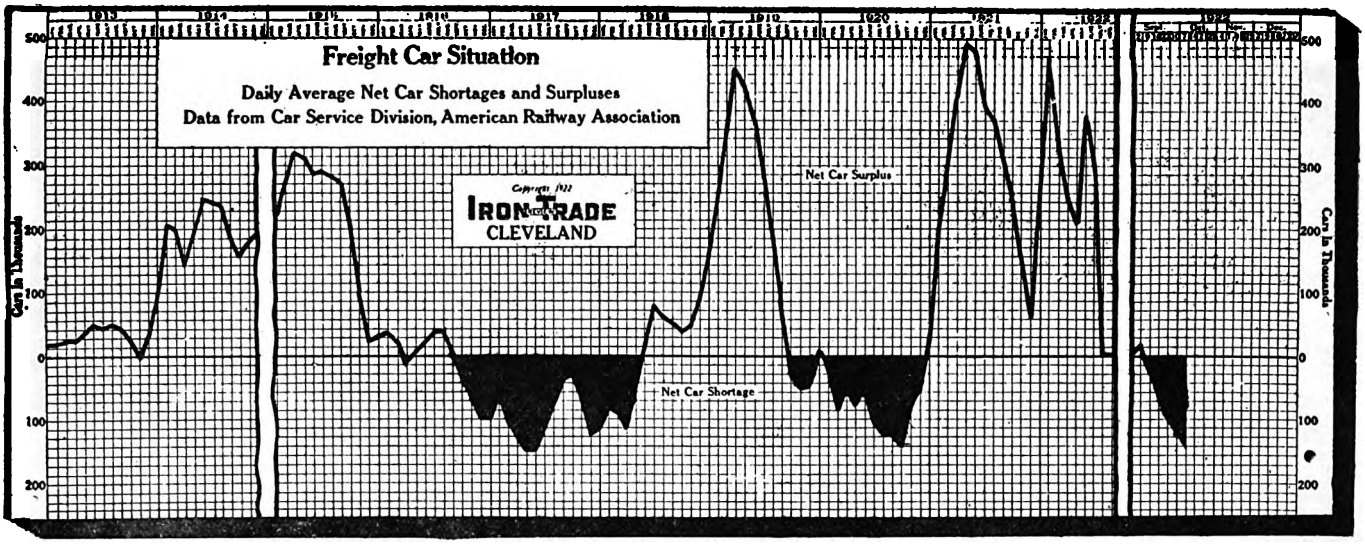
TAR and tar products are fast replacing mineral-oil products for surfacing roads, says the United States Bureau of Mines in Technical Paper 268. This fact may be variously ascribed to the increasing supply of suitable tars, the decreasing supply of suitable mineral-oil products, increased appreciation and recognition of the suitability of tars, and the more general availability of tars in practically all parts of the country.

A number of specifications have been drawn up for the tar to be used for this purpose, a fact not at all surprising in view of tars being produced under so many different conditions, and the roadbed, surfacing materials, and traffic and climate conditions differing widely from place to place. Road tars are used for various purposes, and may be applied in different ways to obtain a particular result—a further cause for the wide variance in specifications. They may be used as a binder in place of cement, as in bituminous macadam roads, for dust-settling purposes or for cementing material—grouting—in the construction of brick, stone, or wood-block pavements. Although the material used for these purposes is usually either a soft pitch or a refined tar, or a mixture of the two, it is quite generally termed "road tar."



(Chemical Bulletin)

Wholesale price comparisons of basic commodities. (Average price in 1913 equals 100.) Hollow columns measure peak of 1920 prices. Solid lines within hollow columns measure the level of prices at lowest point reached during the depression. The solid column on right of each group represents prices in September 1922.



Freight car shortage becoming acute. Record since 1913 of daily average net car shortages and surpluses.

Railroads Still Buying Heavily

THE railroads of the United States are buying great quantities of equipment. This purchasing, which has been forced upon the railroads by the fall rush of traffic and by their failure—or inability—to buy enough equipment in recent years, has been one of the main props of the steel market. The railroads are buying rolling stock now in the belief that business is going to be good with them. They are preparing to carry the goods which will be produced by a prosperous nation.

The railroads of the United States, from January 1 to August 1 this year, had 25,763 more new cars, either ordered and under construction or installed in actual service, than during the entire year of 1921, according to reports which the carriers have just made to the Car Service Division of the American Railway Association.

During the seven months' period which ended on August 1 last the railroads have installed or had on order 95,199 freight cars of various kinds. During the year 1921 a total of 69,436 were ordered or installed in service.

Of the total ordered by the various railroad companies or already installed, 41,405 were coal cars of various designs. Orders calling for the delivery of 29,175 coal cars were in the hands of car manufacturers on August 1 last, and delivery of these cars is under way daily. Up to August 1 last 12,230 new coal cars had actually been installed since the first of the year. During 1921, 30,698 new coal cars were either placed in service or were ordered.

There were also 39,612 box cars, either installed or on order during the first seven months this year. These reports showed that orders for 31,610 existed on August 1 last, while 8,002 had actually been delivered and placed in service during the period from January 1 to August 1 last. Reports showed 21,543 new box cars were ordered and installed in 1921.

That the railroads are also augmenting their supply of refrigerator cars is shown by the fact that on August 1 orders had been placed for 6,428. During the first seven months this year 3,870 had actually been installed and placed in service, making a total of 10,318 as installed or on order. During the year 1921 the number of refrigerator cars ordered or installed totaled 9,355. These figures, however, do not include new refrigerator cars purchased by private companies.

The *Manufacturers Record*, which has sent a questionnaire on equipment buying to the leading railroad presidents of the country, believes that although a large amount of rolling stock has already been contracted for, the amount thus far ordered will not begin to meet the requirements of the country. In support of this statement, the magazine publishes the following survey of the equipment buying of the past two decades:

"During the last eight years the number of cars and locomotives ordered by the railroads has been extremely small as compared with preceding years. As far back as 20 years ago the railroads were ordering more than 4000 locomotives a year and nearly 200,000 cars annually. Last year the railroads ordered 239 locomotives and 23,346 cars; figures so absurdly small as to be startling in the significance of their meaning as an explanation of the breakdown of traffic facilties.

"In 1905 the number of cars ordered by the railroads rose to 341,000, and in that year the roads ordered 6265 locomotives.

"In 1906, 310,000 cars were ordered and 5642 locomotives. The number of cars ordered in those two years exceeded by 50,000 the total number of cars ordered during the last seven years, and was nearly equal to the total number ordered during the last eight years.

The 11,907 locomotives ordered in 1905 and 1906 largely exceeded the total number ordered during the last six years.

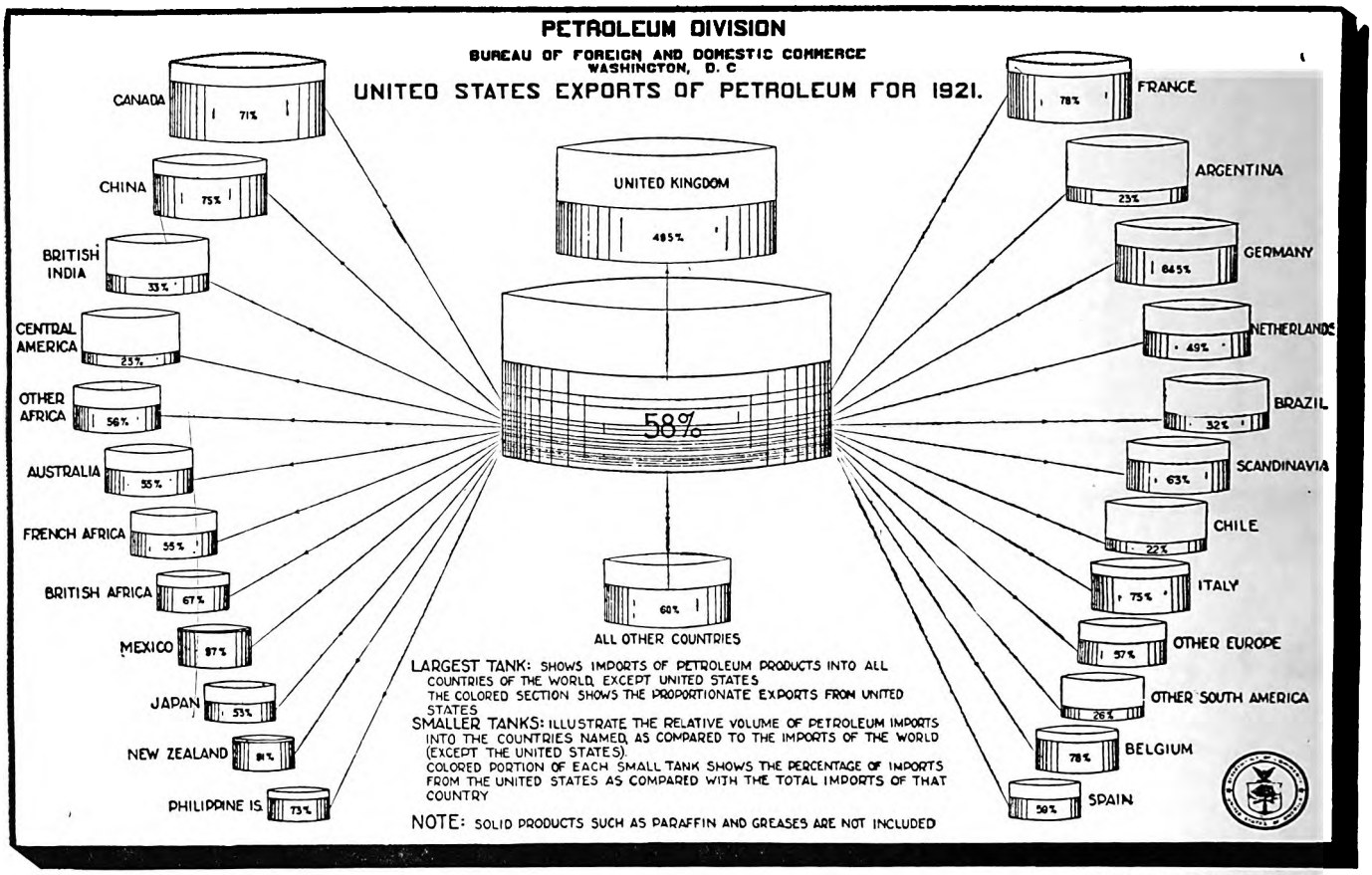
"The following figures show year by year, beginning with 1901, the number of cars and locomotives ordered for the entire country. The present year will make a little better showing than 1921, but the figures for that year are so insignificant as to be almost negligible.

Locomotives and Freight Cars Ordered Since 1900

Year	Locomotives Number	Cars Number	Year	Locomotives Number	Cars Number
1901.....	4,340	193,439	1912.....	4,515	234,758
1902.....	4,665	195,248	1913.....	3,467	146,732
1903.....	3,283	108,936	1914.....	1,265	80,264
1904.....	2,538	136,561	1915.....	1,612	109,792
1905.....	6,265	341,315	1916.....	2,910	170,054
1906.....	5,642	310,315	1917.....	2,704	79,367
1907.....	3,482	151,711	1918.....	2,593	114,113
1908.....	1,182	62,669	1919.....	214	22,062
1909.....	3,350	189,360	1920.....	1,998	84,207
1910.....	3,787	141,024	1921.....	239	23,346
1911.....	2,850	133,117			

"The development of traffic on American railroads is indicated by the ton mileage for different periods beginning with 1900, in which year the total ton mileage was 141,596,550,000,

(Turn to page 1860)



(U. S. Bureau of Census)

Graphic representation of U. S. petroleum exports during 1921.

Will Debt Cancellations Help Exports?

WILL the cancellation of Europe's debt to the United States aid our export trade? Many persons have urged that it would, and have suggested that for that reason we be lenient toward our European debtors.

George E. Smith, president of the Royal Typewriter Co., differs with this opinion. In a speech before the thirteenth annual convention of the Manufacturers' Export Association, he said:

"The problem of the Allied debt is largely a problem of the American export manufacturer. From the manufacturing exporter's standpoint, if it were possible for him to hold a selfish viewpoint, what would be gained in the cancellation of these debts? All these debts put a penalty on war, even a defensive war; they act as a deterrent and their cancellation would remove such an influence.

"The American manufacturer is more concerned, in my opinion, in re-establishing the peace of Europe, which, with time, is the only thing that will bring back export trade.

"I doubt if cancellation of these debts would give any great advantage to American manufacturing exporters in the markets of the world.

"Its first effect would be a rise in exchange in the currencies of foreign countries, and Germany would be affected probably just as much if not more, than any of the others, because it is natural to assume that other cancellations would follow ours. This rise in exchange would make the purchase of American dollars a little easier for the time being, probably due to speculation and not trading.

"It is a question whether the cancellation of these debts could be made the means of stopping inflation—inflation can only be stopped by strong governments. Unemployment, due to the rise in currency values, might be expected, to be followed by disturbed political conditions which, under certain governments, might lead to serious consequences.

"The question of the cancellation of the debts would then resolve itself into a psychological one; and it is a question whether these various countries would buy more American goods on account of feeling more friendly toward us as a result of these cancellations.

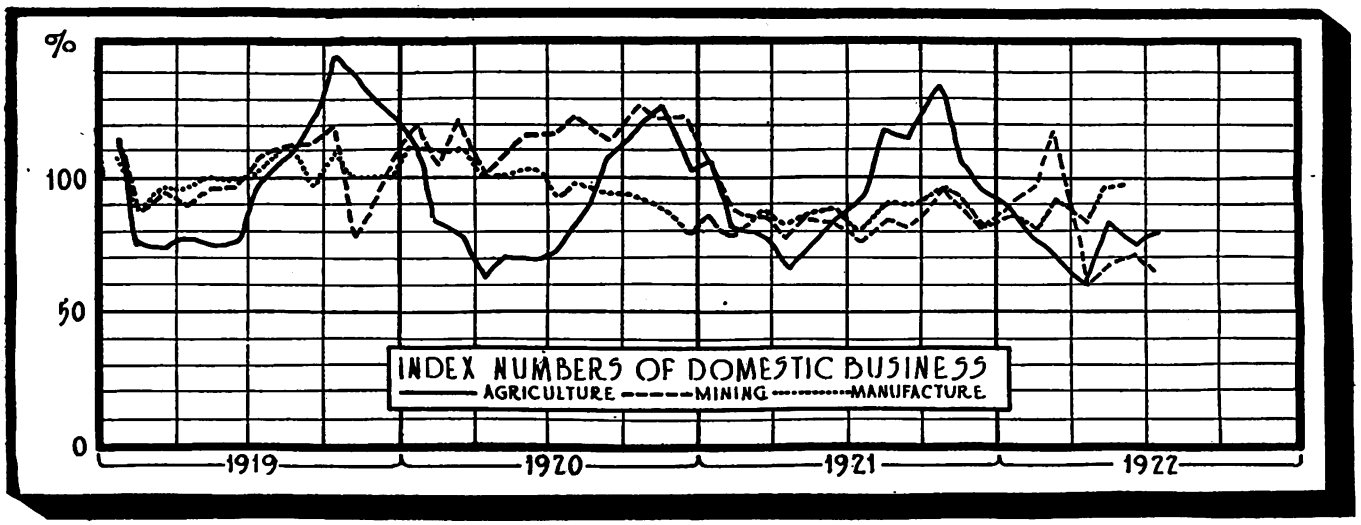
"When in trade we get away from economics and onto the question of psychology—every reader has his own opinion, 'as to how much sentiment would be created by an act of this kind,' and 'How much this sentiment would affect our export trade.'

"If these debtor countries, or practically any of them, were to make known their intention to discharge these obligations at the earliest possible moment, their credit in America would probably rise to such a point where they could float securities from time to time in excess of their interest charges, and probably establish a corrective influence upon the balance of trade and so start American goods again to those markets.

"It has been suggested that if the debtor countries wish to have any securities cancelled they can begin by cancelling their own internal loans and paying their external obligations, but this looks to me a doubtful expediency—the destruction of credit anywhere.

"From a practical standpoint of American manufacturers, England should be dealt with as leniently as any, and if

(Turn to page 1861)



(Magazine of Wall Street)

Comparison of the index numbers of agricultural, mining and manufacturing business 1919-1922; agriculture shows greatest seasonal fluctuation.

What Does the Rise in Money Rates Mean?

ECONOMIC observers who help business men to judge the course of events are intensely interested in the present upturn in money rates. They agree that this is the most important factor in the present situation. They see in it a cause for apprehension as to the continuance of the business improvement; but they are careful to point out that the improvement is not yet over, that there is no reason to believe that the rise in money rates will be sustained, and that other fundamental conditions point to further expansion. *Harvard Economic Service* says:

"The upward movement of money rates is the most significant factor in the business situation at the present moment. It does not alter our forecast of a continued rise of prices and further expansion of business activity during the first half of 1923, with a strong probability that both movements will be continued during the second half of the year. This statement does not imply that the upward swing of business will necessarily terminate in 1923; but means simply that until the first of next year we shall not have the data needed for a longer forecast.

"The rise of actual money rates during the past two months was no greater than that which regularly occurred each autumn in pre-war times. The stiffening of rates this year may be entirely due to seasonal demands reinforced by deferred credit requirements growing out of transportation and labor difficulties. In any case our strong banking situation makes it improbable that a sharp and sustained rise of money rates will occur for a considerable time to come.

"The evidence indicates that the lowest point of money rates in the present business cycle was registered in August, 1922. Preceding that month a drastic decline of money rates had been in progress for more than a year—prime commercial paper, for instance, fell from 7¾ to a minimum of 3¾% between April, 1921, and August, 1922. Stock and bond prices had been steadily advancing for a year; trading on the stock exchanges had expanded; and a great volume of new securities had been issued. These changes in the securities markets meant a growing demand for credit. Substantial increase in the volume of business and in commodity prices had been under way for eight months. Expanding business at higher prices meant that the needs of business men for credit also were increasing. But the banking situation was very strong; frozen credits were thawed out; and money rates, as we have said, declined. Ultimately, however, steadily increasing credit requirements operate to check a decline in rates and, perhaps, bring about an advance. In September, seasonal requirements for credit were added to those of expanding speculation and business. As a result of this combination of demands for credit, short-time rates—the price of bank credit—ceased to decline and began to advance. What significance has this change of trend for the movements of security prices in the immediate future?

"First, the termination of a drastic decline in money rates is not usually followed by a period of steady advance. In fact, since 1900 every considerable decline of money rates was followed by a period of easy money lasting a year or more, for instance 1900-01, 1904-05, 1908-09, 1911, and 1914-15. It is likely, therefore, that a considerable period of easy money is to come.

"Second, before the war, back as far as the data for industrial stock prices and money rates are available (1897), there was never an interval of less than a year between (*a*) the date on which money rates, adjusted for seasonal influences, terminated a drastic decline and (*b*) the subsequent date inaugurating a major downward movement of stock prices. On this basis, therefore, it is not probable that the end of the present period of speculative activity will come before the middle of 1923.

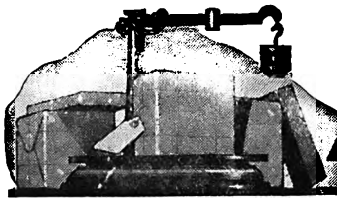
"Third, major bull stock markets in pre-war times commonly lasted two years or more— 1897-98, 1900-02, 1904-06, and 1907-09. An advancing market began about fourteen months ago; on the basis of precedent its continuation until the middle of next year is probable.

"Fourth, since 1897 every major downward movement in industrial stocks has been signaled by a rise of 1¼% in rates on commercial paper—duly corrected for seasonal influences. Similarly a decline in bond prices has been forecast by a rise of 1% in corrected money rates. This year the rise in actual rates has been only about ½% and the rise in corrected rates is hardly appreciable. Hence, this signal for a downward movement has not been given."

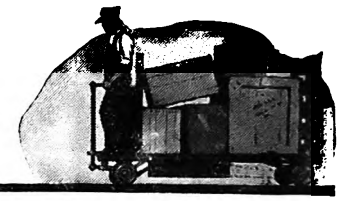
The *Brookmire Economic Service* urges its clients not to fear that the weakness in the stock market means a weakness in general business conditions. It says:

"The course of the stock market is used so widely as a barometer of future business conditions, that the weakness shown during the last three weeks has given rise to some

(Turn to page 1860)



AT A GLANCE



Building

BUILDING contracts awarded during October in the 27 Northeastern States amounted to $253,137,000, according to the F. W. Dodge Co. This figure is 14% ahead of October, 1921. The progress of the seasonal decline in October is shown in the drop of 7% from the previous month.

Residential construction continues at a very high rate, October contracts for this class having amounted to $110,776,200, or 44% of the month's total. This was an increase over September residential construction. Other October figures were: $41,477,000, or 16% for public works and utilities; $32,037,000, or 13%, for business buildings; $27,640,000, or 11%, for industrial buildings, and $17,437,000, or 7%, for educational buildings.

Coal and Coke

PRELIMINARY returns received by the Geological Survey on coal loaded at the mines in the week ended November 11 indicate a total production of 12,600,000 net tons, of which about 10,700,000 was bituminous coal and 1,900,000 tons was anthracite. Revised estimates for the week ended November 4 show 10,617,000 tons of bituminous and 1,839,000 tons of anthracite mined.

Between September 1 and October 1 stocks increased 6,000,000 tons. Since October 1 they have increased at least as much again.

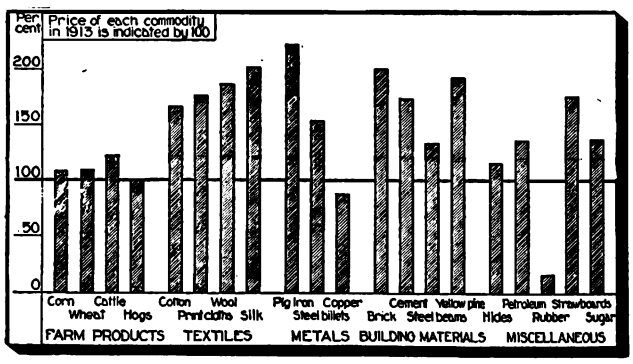
Retail coal dealers' stocks of anthracite on October 1 were the lowest at any time in the period over which stock records extend. Stocks on the Lake docks were about 3% of those of last year. There is little anthracite in the storage yards of the producers. Since October 1 reserves have increased.

The total production of by-product coke during October was 2,806,000 tons, an increase of 563,000 tons, or 25% over August, and of 226,000 tons, or 9%, over last June, the largest preceding month of the present year. The ovens operated during October at 76.5% capacity. Of the 71 plants reporting 59 were active and 12 idle.

Stocks of surplus coke at by-product coke plants have dropped to one-fourth of what they were last March. The quantity remaining on October 1 was about 270,000 tons.

Cereals

WHEAT production in 1922, according to latest estimates, is 99% of the production in 1921, being 109% of last year's in North America and 81% in Europe. Conditions of the new wheat crop are good in Argentina, Australia and India, and about average in South Africa. In Russia, according to a commercial report, the germination of the newly sown wheat has been retarded by poor weather conditions.



(Harvard Economic Service)

Relative prices of basic commodities, September, 1922.

Petroleum

THE American Petroleum Institute estimates that the daily average gross crude oil production in the United States for the week ended November 4 was 1,615,200 barrels, as compared with 1,583,250 barrels for the preceding week, an increase of 31,950 barrels, and 1,192,380 barrels for the corresponding week of 1921.

Crude Petroleum Statistics

	Sept., 1922	Aug., 1922	Sept., 1921
Production—barrels	45,200,000	46,500,000	36,500,000
Consumption—barrels	49,600,000	50,100,000	41,600,000
Imports—barrels	6,500,000	8,400,000	9,100,000
Stocks—barrels	273,300,000	271,900,000	172,900,000

Cotton

FIGURES compiled by Government departments place the world's consumption of American cotton for the year ending July 31, 1922, at 12,293,000 bales and the estimated available supply of American cotton in America for the season 1922-23 at 12,793,000 bales.

Exports of American cotton for the week ending November 3 were the largest for any single week for some time, amounting to 305,298 bales, compared with 129,868 bales the previous week and 162,799 bales for the corresponding week last year.

Certificated stock at New York on November 3 was 39,013 bales, and at New Orleans 75,588 bales. Total stocks all kinds at New York, 63,369 bales, and at New Orleans, 249,266 bales.

Lumber

THE following record of the lumber industry is made up of reports from 128 mills to the Southern Pine Association:

Week ending	Orders	Shipments	Production	Normal Prod.
November 3—feet	60,685,053	61,830,054	72,897,104	84,098,723
October 13 (131 mills)	60,865,552	56,511,730	75,646,607	87,418,903
Reports from 43 Mills to North Carolina Pine Association				
November 4	7,800,180	15,364,696	11,796,813	13,614,000
October 28	8,474,603	11,476,659	10,317,116	12,750,000

Electricity

THE average daily production of electricity by public utility power plants in September again broke all records. The daily production was 135,200,000 kilowatt-hours, 3% greater than the August record and nearly 6% greater than the June record.

The daily consumption of both oil and gas in the production of electric power broke all records in September, indicating an abnormal use of these fuels, probably brought about by the difficulty in obtaining coal.

Thousands of Kilowatt-Hours Produced

By waterpower	August—1,486,969	September—1,391,073
By fuels	" 2,576,089	" 2,664,709

Use of Fuels in Production of Electric Power

Coal—short tons	August—2,815,685	September—2,907,672
Fuel oil—barrels	" 1,313,752	" 1,486,629
Natural gas—M cu. ft.	" 3,058,459	" 3,103,873

Paper

STOCKS of all regular grades of paper decreased during the month. Stocks of all grades reported by manufacturers at the end of September amounted to 253,252 tons, including stocks at terminal and delivery points. In addition to these stocks, jobbers and publishers reported newsprint stocks and tonnage in transit aggregating 242,113 tons

Index Numbers of Production Costs

	Nov., 1922	Sept., 1922	Oct., 1921	Jan., 1921
Wood pulp	183	170	167	327
All materials	188	179	160	271
Labor	204	204	204	276

Total—All Grades

	Production	Shipments	Stocks e. o. m.
Sept., 1922—net tons	623,088	638,052	249,516
Sept., 1921—net tons	477,926	489,128	272,807



Basic Commodity Prices

(Minimum, at New York, unless otherwise specified)

	Week Ending Nov. 4	Week Ending Oct. 28	Year Ago
Aluminum, pig (ton lots), lb.	.20	.17	.17
Antimony, ordinary, lb.	.06	.06	.0525
Brick, Hudson R., per M.	16.50	17.00	15.00
Cement, Portland, bbl.	1.70	1.70	1.70
Copper, Electrolytic, lb.	.1375	.1375	.13
Cotton, spot, Mid. Upl., lb.	.2515	.243	....
Hides, Chic. Pack., No. 1, lb.	.23	.23	.155
Lead, N. Y., lb.	.07125	.0675	.047
Petroleum, crude, at well, bbl.	3.00	3.00	4.00
Pig iron, Bessemer, Pgh., ton.	34.77	34.77	21.96
Pine, roofers 6 in., M. ft.	34.50	34.50	31.00
Rubber, Up River, fine, lb.	.24	.23	.225
Silks, Sinshiu, No. 1, lb.	8.35	8.25	6.15
Spelter, N. Y., lb.	.0745	.074	.05
Steel Billets, Bess., Pgh., ton.	40.00	40.00	29.00
Tin, N. Y., lb.	.36	.36	.28
Wool, Dom., ¾ blood com., lb.	.52	.51	.29

Wholesale Commodity Prices

Coal—			
Bit., ¾ in., lump, net ton.	....	5.25	....
Anthracite, egg, net ton.	....	7.75	....
Coke, furnace, net ton.	7.50	8.50	3.10
Cotton Goods—			
Brown Sheetings, Std. yd.	.15	.145	.135
Standard Prints, yd.	.105	.105	.11
Print Cloths, 38½ in., 64x60, yd.	.09625	.09625	.095
Drugs and Chemicals—			
Alcohol, ethyl, form 5, gal.	.36	.36	.40
Alcohol, wood, 95%, gal.	.94	.94	.65
Alum, lump, lb.	.035	.035	.035
Bleaching Powder, over 34%, 100 lbs.	2.00	2.00	2.25
Borax, crystal, in bbl., lb.	.06	.06	.055
Caustic Soda, 76%, 100 lbs.	3.60	3.45	4.10
Lime, factory, 200-lb. bbl.	1.90	1.90	1.90
Nitric Acid, 42°, lb.	.055	.055	.0675
Saltpeter, crystal, 100 lbs.	.0775	.0775	.08625
Soda Ash, 58% light, 100 lbs.	1.75	1.75	2.15
Sulphuric Acid, 60%, 100 lbs.	.50	.50	.55
Flour—			
Spring Pat., 196 lbs.	6.75	6.65	6.50
Winter, soft str't, 100 lbs.	5.75	5.60	5.50
Grains—			
Wheat, No. 2 Red, bu.	1.38	1.335	1.0775
Corn, No. 2 Yellow, bu.	.9025	.8925	.64
Oats, No. 3 White, bu.	.54	.53	.41
Rye, No. 2, bu.	1.005	.945	.7875
Barley, malting, bu.	.81	.82	.595
Hay, No. 1, 100 lbs.	1.35	1.35	1.45
Straw, lg., rye, No. 2, 100 lbs.	1.15	1.15	1.05
Hides—			
Cows, heavy native, lb.	.21	.21	.14
Country, No. 1 steers, lb.	.15	.15	.09
Iron and Steel—			
Basic, Valley furnace, ton.	30.00	30.00	19.00
Steel bars, Pittsburgh, 100 lbs.	2.00	2.00	1.60
Beams, Pittsburgh, 100 lbs.	2.00	2.00	1.60
Galvanized Sheets, No. 28, Pittsburgh, 100 lbs.	4.50	4.50	3.90
Leather—			
Union backs tr., lb.	.50	.50	.42
Scoured oak backs, No. 1, lb.	.55	.55	.54
Lumber—			
FAS Qtd. Wh. Oak, 4/4", M. ft.	145.00	145.00	150.00
Tonawanda Wh. Pine No. 1 barn 1x4", M. ft.	82.00	82.00	86.00
Adirondack Spruce, 2x4", M. ft.	38.00	38.00	44.00
No. 1 Com. Y. Pine Bds., 1x4", M. ft.	47.25	47.25	40.00
Oils—			
Coconut, spot N. Y., lb.	.085	.085	.105
Crude, tks, f.o.b., coast, lb.	.07125	.07	.08
China Wood, bbls., spot, lb.	.125	.1275	.1525
Cottonseed, lb.	.0925	.09	.09
Linseed, city, raw, gal.	.95	.94	.74
Paraffine wax, ref., 125 m. p., lb.	.0325	.0325	.03625
Turpentine, gal.	1.64	1.66	.82
Paints—			
White Lead, in oil, lb.	.105	.105	.1225
White Lead, dry, lb.	.0775	.0775	.065
Zinc., Amer., lb.	.07	.07	.075
Paper			
News roll, 100 lbs.	4.00	4.00	4.00
Book SS. & C., lb.	.07	.07	.0675
Wood Pulp, ton.	....	....	80.00

Financial

Bank Clearings	Week Ending Nov. 4	Week Ending Oct. 28	Year Ago
New York	$4,776,955,074	$4,449,482,121	$4,412,846,410
Chicago	548,808,001	567,961,667	486,263,952
Entire Country	8,060,000,000	8,211,000,000	7,438,000,000
Increase or decr.	+8.3%	+25.7%	—19.8%

(Per cent of total from preceding year)

Cost of Money—New York	Week End. Nov. 4	Week End. Oct. 28	Year to Date	Year Ago
Call Loans	6@4½	6@4¼	6@2¾	6@4½
Time Loans (60-90 days)	5@4¾	5@4¾	5@3½	5½@5¼
Six Months	5	5@4¾	5@3¾	5½@5¼
Com.Discount,4-6mos.	5@4½	5@4½	5@4	6@5½

Financial Transactions	Week Ending Nov. 4	Week Ending Oct. 28	Year Ago
Stock Sales, shares	3,418,576	5,528,885	2,760,688
Aver. Price, 25 Railroads	62.82 h. 61.01 l.	69.22 h. 67.01 l.	52.26 h. 50 l.
Aver. Price, 25 Industrials	99.54 h. 96.25 l.	113.66 h. 108.14 l.	74.43 h. 72.50 l.
Sales of Bonds, Par Value	$58,153,350	$90,369,250	$50,737,150
Aver. Price, 40 Bonds	79.95 h. 79.80 l.	80.58 h. 79.87 l.	68.96 h. 67.93 l.
Average Net Yield, 10 High-Grade Bonds	4.545%	4.635%	5.541%
New Security Issues	$26,555,000	$31,629,000	$19,000,000

Business Failures	Week End. Oct. 19	Week End. Oct. 26	Year Ago
Number	364	357	303
	Oct., 1922	Sept., 1922	Oct., 1921
Liabilities	$36,941,884	...	$48,371,395
Number	1,600	1,469	1,809

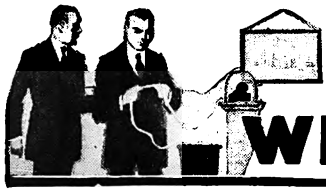
Industrial

Building Permits (153 cities)	Sept. 1922	Aug., 1922	Sept., 1921
	$193,121,650	$212,909,181	$147,800,846
Idle Freight Cars	Sept. 30, 1922	Sept. 23 1922	Aug. 23, 1922
Number	133,081	143,623	283,967
Car Loadings	Oct. 21, 1922	Oct. 14, 1922	Sept. 16, 1922
Number	1,003,759	983,470	945,919
Steel and Iron Barometer	Sept. 30, 1922	Aug. 31, 1922	Sept. 30, 1921
U. S. Steel Orders (tons)	6,691,607	5,950,105	4,560,670
Daily Pig Iron Prod. (tons)	67,791	58,586	32,850
Monthly Pig Iron Prod. (tons)	2,033,720*	1,816,170†	985,529*

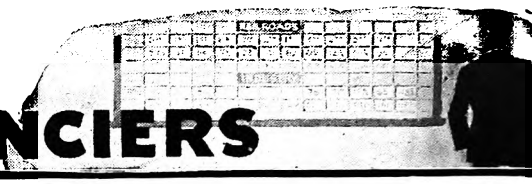
*Month of September. †Month of August.

Foreign Trade	September, 1922	August, 1922	September, 1921
Exports	$313,091,682	$302,000,000	$324,863,123
Imports	228,794,639	271,000,000	179,292,165

Sugar—			
Cent. 96°, 100 lbs.	5.53	5.53	4.00
Fine Gran., in bbls., 100 lbs.	6.90	6.90	5.20
Wool—			
Boston Aver. 98 quot., lb.	.7684	.7408	.4029
Stand. Clay Wor., 16-oz., yd.	3.25	3.25	2.85
Fancy Cassimere, 13-oz., yd.	2.45	2.45	2.25
Serge, 36", Wor., yd.	.65	.65	.50
Broadcloth, 54", yd.	3.00	2.875	2.50
Cottonwarp serge, 36", yd.	.475	.475	.45



WITH THE FINANCIERS



Has the Bond Peak Passed?

WHAT is going to happen to the bond market? To the investor, and to the industrial leader as well, this is one of the most interesting financial questions of the moment.

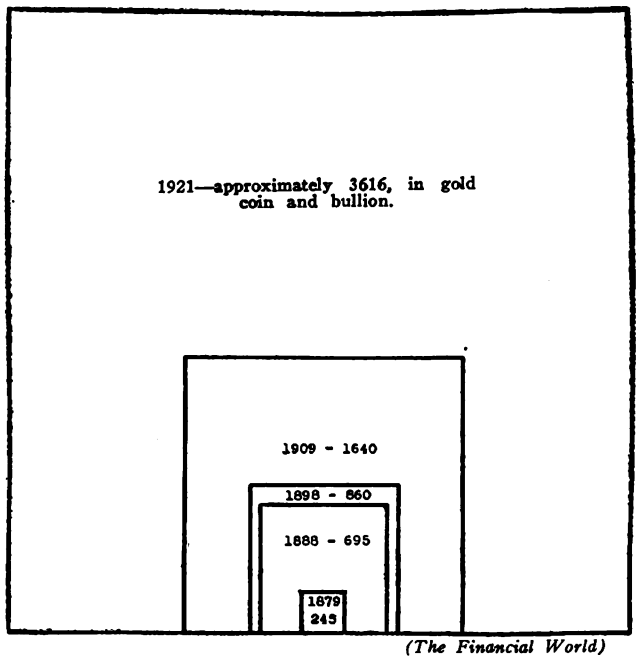
Bond prices recently have sagged decidedly. If this decline is not temporary, but is indicative of a general trend, the significance to the investor is, of course, that he must place his funds in other markets if he is to get the most out of his money. To the industrial executive it means that if his corporation expects to issue bonds it had better do so quickly if it is to get its money at the lowest possible rate.

Financial observers are reluctant to believe that a general decline in bond prices has set in, yet as the weeks pass they are driven to consider this possibility. Most of them, after due deliberation, are inclined to believe that the reaction is only temporary; yet the more conservative of them are careful to state that the situation contains many doubtful factors. F. Schneider, Jr., writing in the *New York Evening Post*, thinks that the general situation, outside the bond market, is such that a protracted decline at present is not probable. The *Brookmire Economic Service* says:

"The sag in bond prices the last five weeks has given rise to a rather wide-spread belief that the peak of the bond market has been passed and that a major downward trend has set in which will carry prices to substantially lower levels before they again rise to the levels reached in August and September.

"There is no doubt that we are now in the phase of the bond market cycle in which the bullish and bearish factors are nearly at a balance and any important change in even a single fundamental factor at such a time may be sufficient to reverse the price trend.

"The element of the greatest weakness in the market at the present time is a technical condition. This is the great amount of investment securities which have not been accumulated by their present holders for the employment of permanent investment funds, and which under certain changed conditions, will come back into the market in large volume.



(The Financial World)

How the stock of gold coin in the United States has grown since 1879 (represented by the smallest square in the diagram). The amounts are given in millions of dollars.

In the Investment Opportunity Bulletin of July 24 we discussed the large amounts of investment securities held by banks and industrial corporations for the employment of funds, which temporarily were not needed for other purposes, and which would find other fields of employment in a period of increasing business activity. An abnormally large amount of bonds and high-grade investment stocks have also been accumulated during the past two years for speculative purposes. These facts constitute a technical weakness which in the next few weeks will be likely to counteract, to some extent, the force of fundamental factors which still remain bullish, and will be quite sure to accelerate the first period of decline after the major downward trend in prices sets in. This technical weakness made itself felt quite strongly in the past few weeks when considerable selling was done on the assumption that prices had entered a major downward swing. And this tended to have a softening effect on prices at a time when fundamental conditions still remained sound.

"This condition, however, did not alone cause the sag in prices. The floating of the large Government loan undoubtedly had a further effect to this end. Prior to the announcement of the loan, there was considerable speculation concerning the interest rate it would bear. In many quarters it was believed that a lower rate than 4¼% would be offered. The desirability of a long-term 4¼% bond, carrying attractive tax-exempt features, held a strong appeal, and many of the high-grade corporation issues, fully subject to taxation, lost some of their attractiveness by comparison, with a consequent softening in prices."

The service comes to two major conclusions: first, that the prices of long-term bonds have not yet reached the major turning point, but, second, that further advance in these bonds will be narrow and of too short duration to justify investors in purchasing more long-term bonds—exceptional bargains excepted—with a view to shifting to short-term securities when the real price turn comes.

"Don't Worry About Bonds"

FAR less conservative is Roger W. Babson. He tells his followers in bold type: "Don't Worry About Bonds," adding:

"Recent recessions in the bond market have disturbed many investors. Both banks and individuals are asking if the peak of the upward movement has been reached and a downward swing begun. Our answer is No! Bonds move in inverse relation to the business cycle. They advance during times of depression and decline during times of prosperity. The lowest point in bond prices almost invariably occurs near the close of an area of over-expansion.

"For two years past we have had a period of business depression, and, true to form, bond prices advanced. Now the business statistics indicate greater activity and a greater demand for capital. Consequently the rise in bonds for the time being is checked. The depression, however, is only about 55% completed. Hence the current recessions in bonds are only temporary. If the business this winter improves considerably, which is entirely possible, we shall see further hesitation in most classes of bonds. Such reactions will be only an interruption in the long upward swing. They do not indicate a change in the fundamental trend of bond prices.

"Fundamentally, this temporary set-back should prove a good thing for the bond market. The rapid advances of the past year have attracted many speculators. Buyers who had no intention of holding for permanent investment have climbed onto the market for a ride. This element must be be thinned out. Whereas bonds represent capital borrowed for long-term or permanent financing, much of the funds which have gone into the market are short-time money. By that I mean money borrowed of the banks or excessive bond holdings on the part of banks themselves.

"What we must expect during the next few months is a process of digestion of bonds on the part of permanent investors. Banks should always hold a certain amount of good

(*Turn to page 1861*)



Employment Still on Increase

EMPLOYMENT is still increasing. The United States Department of Labor's industrial analysis for October shows an increase in the number of workers employed in 12 of 14 major industries.

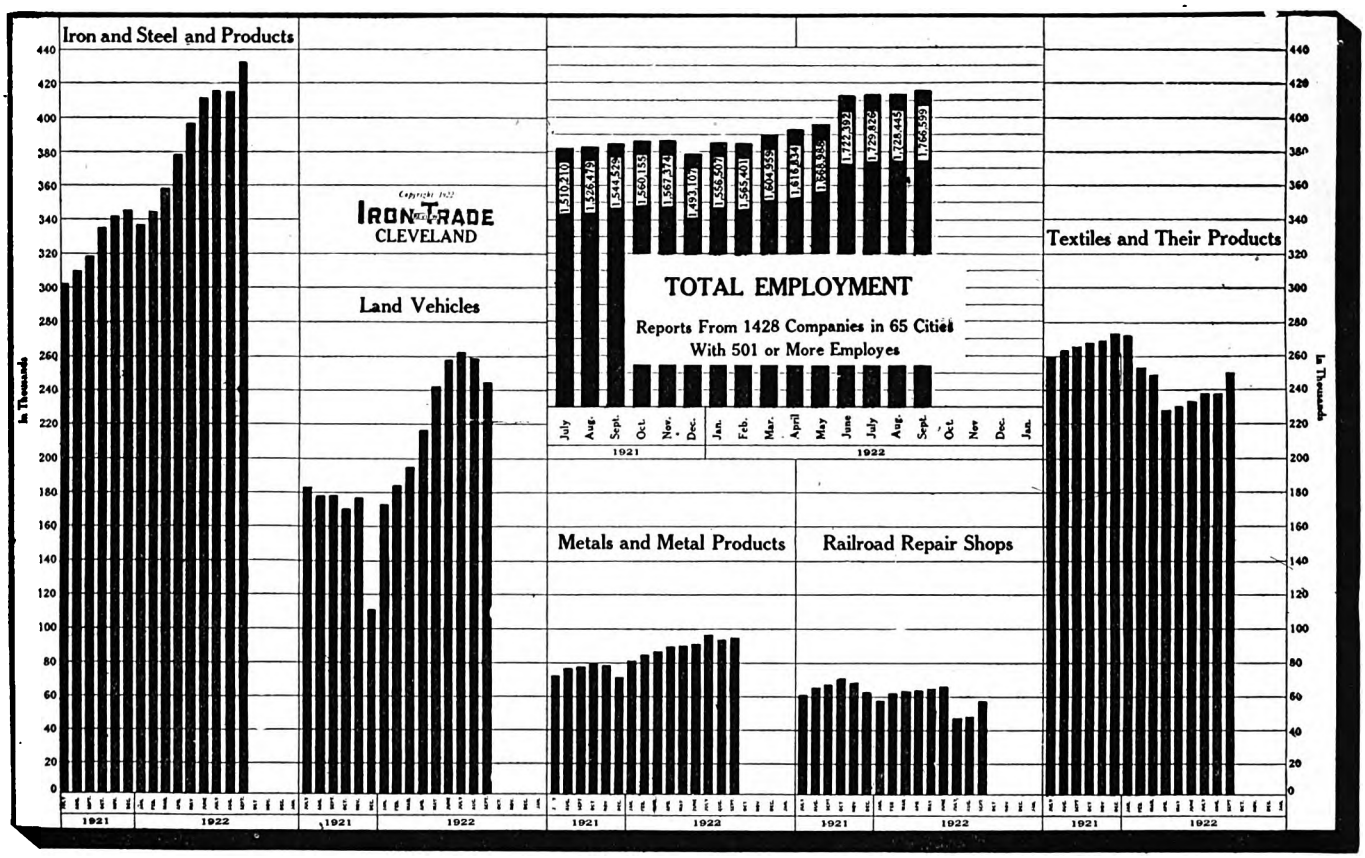
The industries with increased employment are: Railroad repair shops; stone, clay and glass products; iron and steel; chemicals and allied products; vehicles for land transportation; lumber and its manufacture; metal and metal products, other than iron and steel; miscellaneous industries; paper and printing; leather and its finished products; textiles and their products and food and kindred products, while tobacco manufactures and liquor and beverages show a slight decrease over the previous month.

On October 31, the 1428 concerns which are considered in the Department's report had 52,867 more employees on their payrolls than those carried on September 30. Railroad repair shops reveal the most marked improvement in employment, adding 6,700 workers. Stone, clay and glass products show an increase of 1509; iron and steel and their products reveal an encouraging increase of 19,348. Chemicals and allied products increased employment 2946, while vehicles for land transportation, which showed a decrease last month of 16,232, show an increase this month of 8297. Lumber and its manufacture continues to increase, this month having added 752. Metal and metal products, other than iron and steel, though still suffering from inadequate transportation in some sections of the country show an increase of 2444. Miscellaneous industries increased employment by 4728; paper and printing added 912. Leather and its finished products continues to increase, this month adding 899. Textiles and their products reveal an increase of 4223, while food and kindred products show an increase of 1370 employees added to their payrolls. Tobacco manufactures show a decrease in employment, having released 1255 employees, while liquors and beverages dropped 6 from their payrolls.

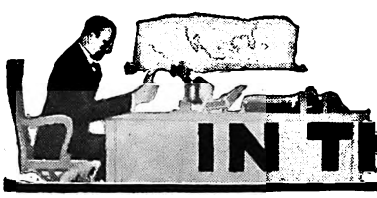
Employment has picked up in all sections of the country and shows a healthy and encouraging condition existing today. The oil industry shows marked improvement in the Southwest; silk mills experiencing a lively revival in the Middle Atlantic States; while the iron and steel industry is rapidly recovering everywhere, although a car and labor shortage seems to be holding operations and employment to a 75% production. Railroad shops are increasing employment, though being held back in some sections of the country from showing larger gains in employment due to the continuance of labor controversies on some lines.

An interesting fact is the continued increasing employment which has maintained for the past six months in Paterson, N. J., Richmond, Va., Worcester, Mass., Milwaukee, Wis., Waterbury, Conn., Syracuse, N. Y., Jersey City, N. J., and Boston, Mass. Lawrence, Mass., Cincinnati, Ohio, Philadelphia, Pa., and Reading, Pa., have added to the number

(Turn to page 1861)



A twelve-month record of employment conditions in the United States. Only the iron and steel industry shows a continued increase, although the figures for total employment show a steady use.



IN THE MANAGER'S OFFICE



The Development of Scientific Management

A FEATURE common to a number of the management week programs throughout the country was the presentation of a paper in which L. P. Alford outlined the progress in management during the past ten years.

To obtain information on the worthwhile changes which have taken place, letters were written to management and industrial engineers, to executives of plants in various lines of industry, and to educators familiar with industrial developments. Combining and weighing these statements, there results three groups of factors, of which the first concerns changes in mental attitude. The ancient controversy as to whether management is a science or an art has subsided, with recognition of the scientific basis of management. The attitude of opposition and mistrust toward management and to the installation of management methods have in general disappeared. Among those responsible for the carrying on of industry there has grown an appreciation of the existence of the problems of management. Acceptance of the principles of management has broadened among engineers, executives in industry and educators.

The second group of factors concerns the application of management methods. The engineering or scientific method has been extended in industrial cost accounting. Appreciation of the possibilities and advantages of standardization, simplification, and elimination of waste has spread rapidly during the past two years. The demand for knowledge, facts, as a basis for judgment has grown insistent in all good management. Management methods have been applied or installed in practically every manufacturing industry.

The third and final group of factors concerns especially significant developments. Management activities have broadened far beyond the installation of those mechanisms which are usually associated with the Taylor System. Some eight or ten of the leading American engineering schools have established courses in management since 1912.

Appreciation of the importance of the human factor in industry and attempts at its study from a fact basis have been the most striking management development. Management engineers have declared that the service motive must prevail in industry and that all questions concerning human relationships must be considered in a spirit free from autocratic feeling.

To secure information as to the use of management mechanisms the question was asked, "What (if any) mechanisms of management do you consider as generally accepted in principle and in practice?" Light systems or mechanisms were found in the majority of the replies. In the order of the number of plants in which they were installed in some form the list reads: (1) Selection and placement, (2) incentive wage plan, (3) balance of stores, (4) purchase control, (5) cost control, (6) planning (routing, scheduling), (7) time study, (8) idle-time analysis. Rearranging in the order of the number of plants where the installation was good, we have: (1) Balance of stores, (2) incentive wage plan, (3) purchase control, (4) selection and placement, (5) planning, (6) time study, (7) cost control and (8) idle-time analysis.

Management as developed through a generation of effort stands today as a great body of knowledge and practice. Through organization it determines policies, plans basically over long periods of time and fixes impersonal relationships; through preparation it plans in detail how, when and by whom work is to be done; through direction it initiates and maintains the processes of production and distribution. Management is the agency by which community, State and Nation must endure.

Controlling Quality of Products

THERE is a generally accepted belief, says G. S. Radford in *Management Engineering,* that quality is more readily controlled in a small plant than in a large one. On the other hand, it is equally well known that practically all large factories produce articles of standard quality. An analysis of the size of a factory in its relation to the problems of quality control shows that both large and small plants may profitably adapt devices and methods which the other has found of value.

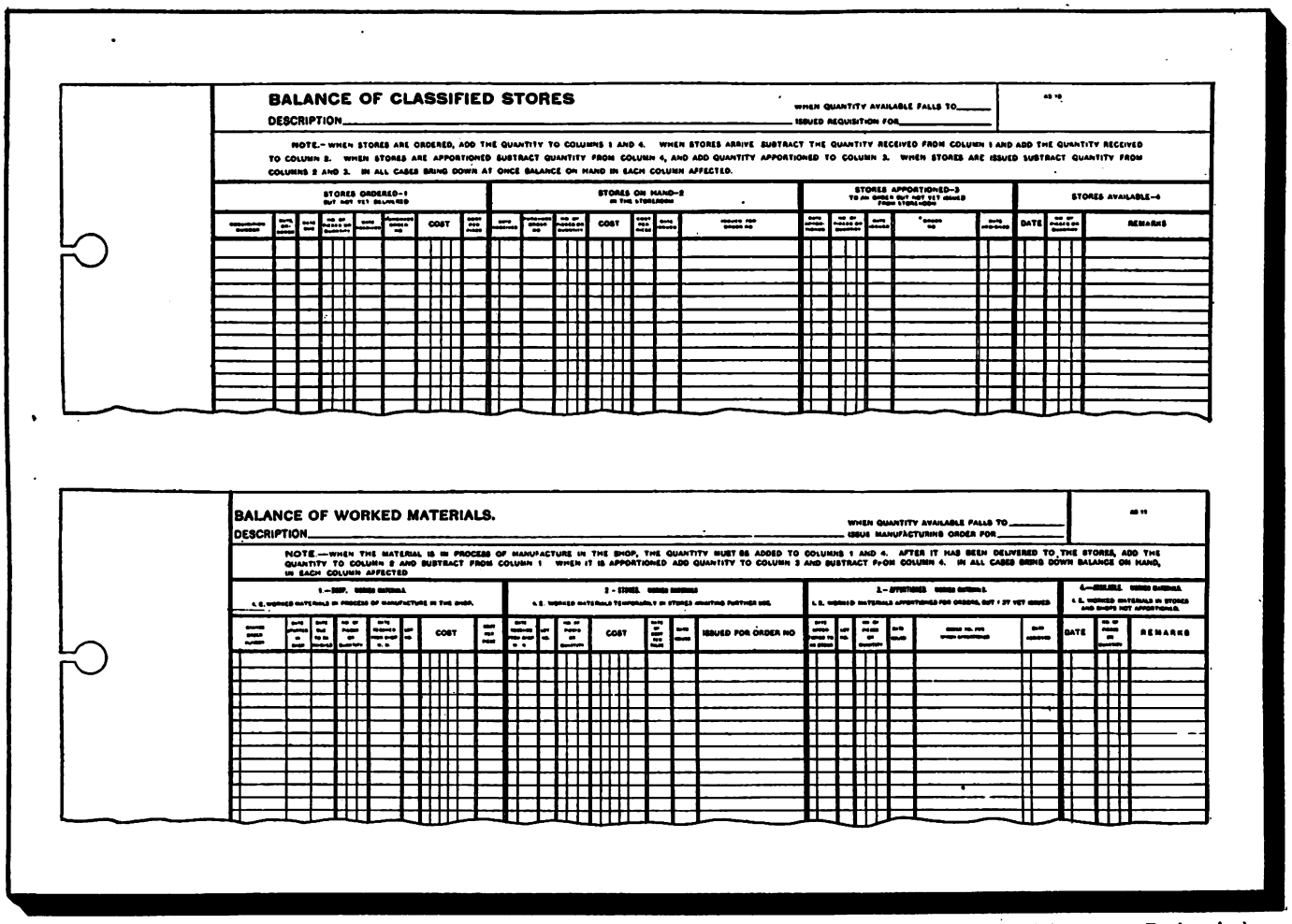
For commercial reasons it is highly desirable that the wants of the purchasing public be given immediate consideration in the factory. It is in this respect that the small plant is most favorably situated. The owner and the management are necessarily close to both the customer and to the production force. Quality always depends on the attitude of the highest controlling executive in the organization. In the small plant this executive, whether owner or manager, is in a position to know the quality standards required and personally to see them carried into effect. In larger plants the problem of guiding the production force toward the desired result is a decidedly more difficult and intricate matter.

From this point of view the size of a plant in reference to the problem of quality may be expressed in terms of the distance separating the management from the actual fabrication of the product. As a factory begins to grow the management is forced to delegate first one function and then another. The control of quality is usually the last to receive attention, unless the factory is fortunate enough to have had a bad slump in quality early in its progress. The danger lies in the fact that quality, as a rule, does not fall off suddenly.

Quality of output will not remain fixed without help, and a growing organization should improve its quality by a definite and intentional campaign. The great advantage flowing from a large volume of business is the economy in overhead expense. The large plant can afford to appropriate more for meeting the demands of quality-control work and thus can enjoy the natural profit which results from such work in the form of lessened losses, increased production of standard goods, improved qualities and lowered costs.

The control of quality begins with the product itself. Just what the desired standards are, as well as what variations therefrom may be safely tolerated, should be known in detail. Definite working standards should be established by developing written specifications for raw material and accurate tolerance and working limits for each process of manufacture. Smaller plants should adopt the exact and careful practices of the large establishments. The same percentage of poor material will have an even greater effect on direct costs in the smaller shop; and though the disturbing effect on the organization is easier to handle, it is in every way undesirable to subject the supervisory force to worry and trouble.

Identified with the subject of exact specifications is the inspection of raw and worked materials. The more uniform the raw material is when it enters the factory, the fewer are the corrective operations which the factory must apply in order to secure a commercially uniform product. The larger



BALANCE OF CLASSIFIED STORES

DESCRIPTION _____ WHEN QUANTITY AVAILABLE FALLS TO _____ ISSUED REQUISITION FOR _____

NOTE.—WHEN STORES ARE ORDERED, ADD THE QUANTITY TO COLUMNS 1 AND 4. WHEN STORES ARRIVE SUBTRACT THE QUANTITY RECEIVED FROM COLUMN 1 AND ADD THE QUANTITY RECEIVED TO COLUMN 2. WHEN STORES ARE APPORTIONED SUBTRACT QUANTITY FROM COLUMN 4, AND ADD QUANTITY APPORTIONED TO COLUMN 3. WHEN STORES ARE ISSUED SUBTRACT QUANTITY FROM COLUMNS 2 AND 3. IN ALL CASES BRING DOWN AT ONCE BALANCE ON HAND IN EACH COLUMN AFFECTED.

STORES ORDERED—1 BUT NOT YET BALANCED | STORES ON HAND—2 IN THE STOREROOM | STORES APPORTIONED—3 TO AN ORDER BUT NOT YET ISSUED FROM STOREHOUSE | STORES AVAILABLE—4

COST | COST | DATE | REMARKS

BALANCE OF WORKED MATERIALS.

DESCRIPTION _____ WHEN QUANTITY AVAILABLE FALLS TO _____ ISSUE MANUFACTURING ORDER FOR _____

NOTE.—WHEN THE MATERIAL IS IN PROCESS OF MANUFACTURE IN THE SHOP, THE QUANTITY MUST BE ADDED TO COLUMNS 1 AND 4. AFTER IT HAS BEEN DELIVERED TO THE STORES, ADD THE QUANTITY TO COLUMN 2 AND SUBTRACT FROM COLUMN 1. WHEN IT IS APPORTIONED ADD QUANTITY TO COLUMN 3 AND SUBTRACT FROM COLUMN 4. IN ALL CASES BRING DOWN BALANCE ON HAND, IN EACH COLUMN AFFECTED

1—SHOP. WORKED MATERIALS IN PROCESS OF MANUFACTURE IN THE SHOP. | 2—STORES. WORKED MATERIALS TEMPORARILY IN STORES AWAITING FURTHER USE. | 3—APPORTIONED. WORKED MATERIALS APPORTIONED FOR ORDERS, BUT NOT YET ISSUED. | 4—AVAILABLE. WORKED MATERIALS IN STORES AND SHOPS NOT APPORTIONED.

COST | COST | ISSUED FOR ORDER NO | DATE | REMARKS

(Management Engineering)

Forms for maintaining a running balance of all materials carried in stock. See text for an outline of the duties of the balance of stores clerk.

factory can afford more elaborate facilities for inspecting its incoming stock, but smaller plants can secure much the same advantage by availing themselves of commercial testing laboratories. Similarly, large enterprises are better able to afford elaborate inspection services for work in process, although the smaller plants would find that the cost of a well-organized inspection department is more than offset by the opportunities for economy in production which it will bring to light.

The wise course for the small and growing plant to pursue is to adopt as many as possible of the devices for controlling quality which have been developed by larger organizations recognized as successful producers of definite quality standards. When some of the refinements are out of reach because of their expense, or are not as yet considered necessary, a development program should be laid out which will permit of their ultimate adoption without upsetting the existing organization.

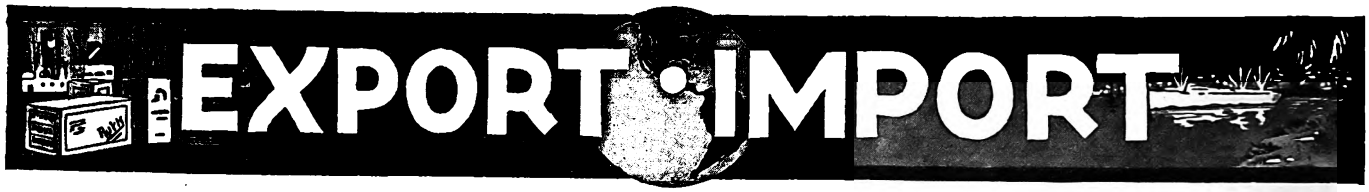
Balance of Stores Clerk's Duties

NO other mechanism of management is probably so well established as the balance of stores or stores inventory. The duties of the balance of stores clerk in the Taylor System of management, as described in *Management Engineering*, are outlined below.

1. It is the duty of the "balance clerk" to maintain, on sheets similar to those shown in the illustration, a running balance of all materials carried in stock, both Raw Material (supplies, fittings, etc., purchased outside) and Worked Materials. 2. These balance sheets should be kept on file and arranged according to the Classification of Stores and Worked Materials, with indices so arranged that the balance sheet for any article may be found quickly when the symbol is known. 3. There should be a balance sheet for each article carried in stock showing (a) quantities of the articles ordered but not received in the storeroom, (b) quantities on hand in the storeroom, (c) quantities for shipping or manufacturing orders which have not been issued, and (d) the quantities available for future requirements. 4. Orders on the storeroom for stores and worked materials are sent to the balance of stores clerk, who apportions or reserves the material required until the receipt of a manufacturing or shipping order. 5. The material reserved is entered in the balance sheets and an equal amount deducted from the quantity available for future use. This amount available is then compared with the minimum limit set up and if necessary a requisition is issued to replenish the stock. 6. The minimum quantity shown on a balance sheet should be such that if a requisition for replenishment is issued at the time the quantity available falls to the minimum, the goods ordered will be received in stock before the balance in stores is completely used up. 7. For purposes of immediate record, the cost of an article is entered as the average cost of all similar articles on hand. When the actual cost is received the difference is added to or subtracted from, the valuation of the balance on hand and the new cost per piece found and entered.

Fair Wages

THE essentials of a wage system are outlined by Harrington Emerson in *Chemical and Metallurgical Engineering* as: (1) Free agreement between employer and employee as to the basic daily wage for the locality and occupation; (2) Definite understanding as to the amount of output, whether through direct work or supervision, or both, that is to be given as an equivalent of the wages; (3) An understanding that any deviation by the employee in the way of delivering more than the contract wage equivalent should be fully recognized and paid for by the employer.



General Import and Export Conditions

CONDITIONS are now ripe for an expansion of our export trade, in the opinion of the *Harvard Economic Service*. Imports have been increasing, the *Service* points out, and in the business cycle the movement of imports usually precedes that of exports. The Harvard experts say:

"Indications in recent weeks point to increased export activity, and a more detailed survey of the data for recent months suggests that we have now a more satisfactory basis for export expansion than we have had at any time since the great decline set in at the close of 1920. It should be remembered that on the decline as on the rise, in this cycle as in former cycles, imports have preceded exports. Taking 1921 as a whole, imports fell off in volume 19% from the 1920 figure, whereas exports fell off but 11%. For several months after the lowest point was reached in July, 1921, the import trade remained at a comparatively low level. These conditions have been closely paralleled in the export trade since the low point was reached last February. It is not improbable that the rise of imports in recent months, in close sympathy with the recovery in general business, is about to be duplicated by a similar recovery in exports.

"Analysis of the recent data points strongly in that direction. As the following table of indices of the physical volume of exports indicates, the comparatively favorable showing of exports in 1921 was due to the fact that exports of food products occurred in remarkable volume in the spring and summer quarters. Food exports in the second quarter were 15% above the quarterly average quantity of food exported in 1920, the year in which our export trade reached the highest figure in our history; and in the third quarter food exports reached the phenomenal figure of 64% above 1920. This was the sole reason why physical volume of exports was so well maintained in 1921. It meant that while exports of manufactures were 36% and raw materials 2% below 1920, food products exported during the year were 18% greater than in that record year.

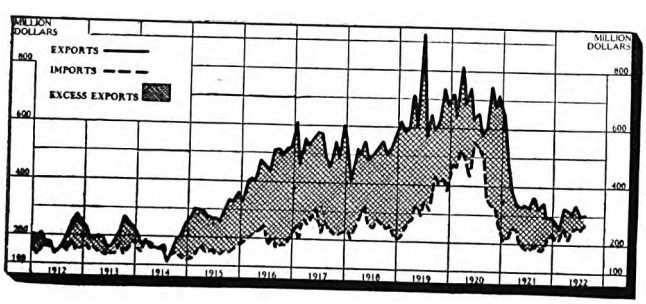
"The most significant index of the state of our export trade is the group of manufactured exports. During the pre-war period the most clearly defined tendency in our foreign trade was the growth, both relative and absolute, of manufactured exports, manufactures constituting in 1914 about half of our total exports. This tendency was reinforced during the period of our greatest export activity, in 1914-20. When the slump occurred late in 1920 it showed itself principally in the exports of manufactures. In 1921 manufactured exports fell in the third quarter of the year to 53% of the 1920 average. It is probable that this figure, rather than the marked decline in total value of exports last fall and winter, which mainly registered the cessation of the abnormal outgo of food products, indicates the significant turning point of our export trade. Since that time the most notable improvement in exports has been in the manufactured products. From the summer quarter of 1921 to the spring quarter of this year exports of manufactures increased 45%, while both food exports and raw materials declined. While quantity indices for August are not yet available, analysis of the value figures of trade reveals that our exports of manufactures were the only group of merchandise to show an increase over the figure for August last year. Exports of raw materials show a substantial loss in value, while exports of foodstuffs have fallen off heavily. The fact that exports of manufactures have advanced substantially from their low point of last year, while food exports have been reverting to normal, provides a more hopeful outlook for expanding export trade in the years ahead than we have had since the storm broke in 1920. Despite the great amount of discussion in recent years concerning the world's need of our raw materials and foods, the fundamental fact on which our hope for a substantial, permanent export trade depends is the resumption of the well-established pre-war tendency toward increasing exports of manufactured products."

Automotive

THE people of South Africa like to ride motorcycles, and American motorcycles are selling well in that part of the world. While the passenger-car and truck business in the Cape has fallen off tremendously during the past year, most of the motorcycle dealers state that their business is holding up well, and one agent in Cape Town who handles one of the best-selling American motorcycles in South Africa says that he is selling almost as many machines now as he did during 1920. Heavy, powerful motorcycles are the most popular in South Africa.

People who, in the United States, would not ride motorcycles ride them extensively in South Africa; it is not at all uncommon to see well-to-do and sometimes prominent men riding motorcycles in this country, often carrying their wives and one or two children in a side car. The economy of operation, which is a very important factor in motor transportation in this country, as gasoline costs 60 to 70 cents a gallon, is another important reason why many people prefer motorcycles to other motor vehicles.

Although more British machines were sold in South Africa before the war than American makes, motorcycles from the United States are now more popular than English machines and according to reliable figures twice as many American machines are now sold here as English.



(Standard Statistics Co.)

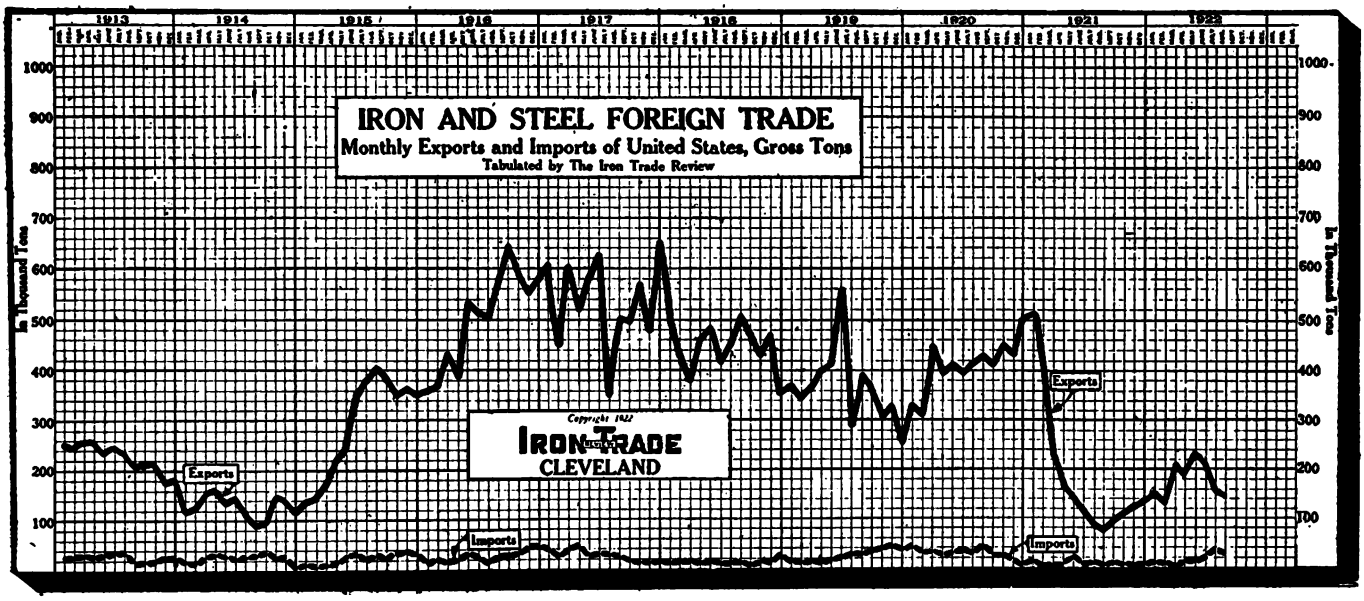
United States exports, imports and trade balance, 1912 to September, 1922.

Chemicals

THE monthly export trade in chemicals and allied products is increasing so rapidly that it is becoming apparent that the total exports for 1922 will probably exceed those for 1921, according to the Chemical Division of the Department of Commerce. This statement is supported by the fact that exports for the seven months 1922 showed a decrease of 3% over the corresponding period of 1921, while the exports for the first eight months of 1922 showed only a very slight decrease—less than 1%—over the same period in 1921. Going back over exports month by month for the first eight months of these two years, the rate of decrease has been gradually lessened, from 28% for the first quarter to less than 1% for the eight months ending August 31. The following table shows by monthly periods the gradual improvement in export trade:

DECREASE IN VALUE OF EXPORTS IN 1922 OVER 1921

Period		*Period*	
January	53	January-May	11
January-February	43	January-June	7
January-March	28	January-July	3
January-April	20	January-August	0.8



Ten-year record of United States iron and steel foreign trade.

Glass

IMPORTS of glass and glass products into the United States from foreign countries reached the highest monthly total in ten years, if not in history, during August, according to figures just compiled. This total was $1,401,006, an increase of $213,324 over July and almost $79,000 in excess of May, which previously had held the record. The imports in August were featured by the great increase in receipts of plate glass as compared with July and with August, 1921.

There was a slight increase in the value of glass exported during August as compared with the previous month, which had fallen sharply in comparison with June. Exports, however, continue to be below the total of the corresponding month last year, as well as below those during the banner year of 1920.

Despite a decline in importations during January and February, total imports during the first eight months of 1922 have reached in value the great total of $8,819,565. This is approximately $1,500,000 in excess of the corresponding period of 1921, which was the largest up to that time. The great increase in imports accompanied a decline in prices, making it more alarming. Much of the increase was due to enlarged receipts of window and plate glass.

Iron and Steel

THE steel trade press reports dulness in the export markets. Japan, which during the past few months has been one of our best customers, has stopped her heavy buying, largely because the needs of her Government and municipalities have been satisfied.

The Consolidated Steel Corporation, the steel industries Webb Act export corporation, has decided to go out of business. This does not mean, however, that the steel manufacturers are giving up their determination to get a share in the world's trade, in the opinion of *The Iron Age,* which points out that "the export subsidiary of the United States Steel Corporation is prosecuting as vigorously as ever its plans for the marketing of a portion of its output in other countries. The Bethlehem Steel Co., since its acquisition of the Lackawanna Steel Co., has taken steps to form its own export company, and others of the companies which have been associated in the Consolidated Steel Corporation under the provisions of the Webb Act may be expected to market a portion of their output abroad, probably selling through long-established companies engaged in the general export trade."

Sugar

UNITED STATES exports of refined sugar in the current calendar year, says the National Bank of New York, will far exceed those of any earlier year in the history of the refining and export trade. The total quantity of refined sugar exported in the seven months of the year is greater than in any full year preceding and is 30 times as much as in the year preceding the opening of the war.

Prior to the war when Europe was producing all of its own requirements from beets, our exports of refined sugar were extremely small, amounting in the year immediately preceding the war, the calendar year 1913, to only 52,000,000 pounds with a value of less than $2,000,000. Of the 1,690,000,000 pounds exported in the seven months ending with July, 1922, 1,392,000,000 or 82% of the total went to Europe, and in the single month of July an exceptionally high record month, the quantity exported was 199,000,000 pounds, of which 175,000,000 pounds or 88% went to Europe. The quantity to Great Britain in the seven months ending with July is 562,000,000 pounds against only 231,000,000 in the same months of last year; to France 328,000,000 pounds against 48,000,000 in the like period of last year; and to Germany, formerly the great sugar producing country of Europe, 104,000,000 pounds against practically nothing in the same months of last year.

Textiles

RUSSIA, which was formerly one of the world's great flax producers, but which naturally has not been a factor in the linen trade for some years, is showing signs of returning to activity in this field.

The acreage under flax in Soviet Russia in Europe has increased, in comparison with 1921, by about 10%, according to Soviet newspaper received at the Department of Commerce. The data of the Central Statistical Bureau show that the acreage under flax in all flax-growing sections, exclusive of Siberia, amounted to 1,139,000 acres in 1921, which indicates an area of about 1,250,000 acres for this year. Taking as a basis the average yield of last year—5.5 poods (1 pood = 36.112 lbs.) of fiber per acre—the crop of 1922 should yield between 6½ and 7 million poods. After allowing for the loss caused by insects and other crop destroyers, and for the farmers' own use, the marketable quantity of flax fiber should amount to 3 to 4 million poods. Considering the requirements of the domestic mills at 2½ million poods, the residue for export will not exceed 1,000,000 poods (about 16,000 long tons).



Selling "Bunk" to Advertisers

THERE is so much "bunk" in the advertising game that it is good, once in a while, to see some of it exposed. This is a task which William L. Day, vice-president of the J. H. Cross Co., has set for himself. In an article in *Advertising and Selling,* Mr. Day suggests that the talk of "merchandising the advertising," which is poured into the ears of advertisers by salesmen for publications and agencies is nonsense, and must be eliminated for the good of the profession.

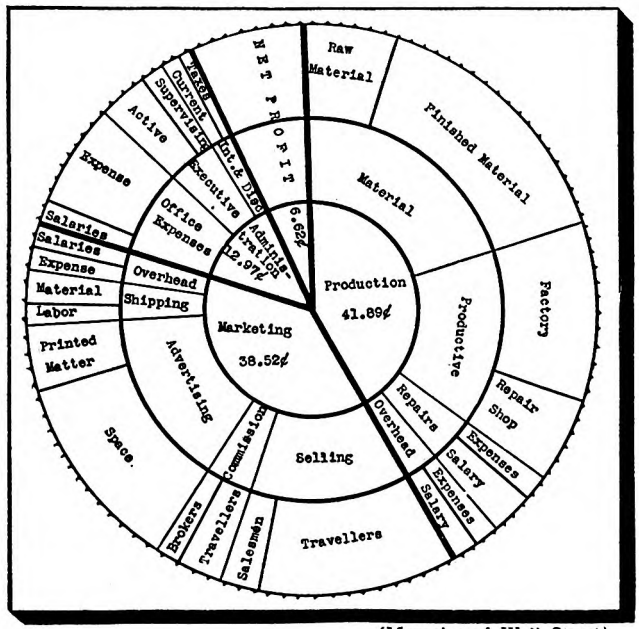
Mr. Day draws a picture of a high-power salesman for an enterprising publisher explaining to the sales force of a new advertiser why and how they should "merchandise" the new advertising campaign. Says the salesman:

"We all understand that what this business needs is more sales (bang!). We know that you will get sales if you merchandise this advertising campaign right (pow!). I want every man in this room to carry with him our circulation statement and this portfolio of beautiful copy. I want him, when he goes in to sell an order of Nusoap, to tell that dealer just what the circulation of the *Home Gazette* is in that city. I want him to sell advertising—not soap. Drive into your trade the facts about this campaign—show him that it is in full pages—in color—that this convincing copy covers a full year. If you men merchandise this advertising in this way, you'll sell soap; you'll make the advertising pay."

Mr. Day comments:

"The term 'merchandising of advertising' was not invented by advertisers. Few of the many chains with which advertising today is bound were invented by advertisers; almost all were the clever (?) inventions of advertising men.

"We 'merchandise' advertising today because 90% of the men selling space in publications and for agencies are afraid to tell the advertiser what advertising really is. The long years of continuous use of expensive space, the courage to plunge into a big campaign, the search for the vital copy idea which will make the copy live, all these are and must be glossed over. 'Merchandise' the advertising—tell the salesmen to wave it in the faces of jobbers and dealers—hammer home big promises of immediate returns. By such 'merchandising' we *may* be able to get back the advertiser's money at the end of the first year—and thus encourage him to continue. Since he has been 'sold' by promises of this sort and has been given no real conception of advertising and of the size of the job he has tackled, it is certain that he will quit us if we fail."



(Magazine of Wall Street)

Typical budget division of sales dollar.

Mr. Day quotes J. T. Dorrance, president of the Joseph Campbell Co., the world's largest magazine advertisers during 1922, as saying that the manufacturer should make his appeal direct to the consumer, and leave it to the consumer to convince the distributor that it is to his interest to handle it. This is in direct contrast to the idea of "merchandising advertising," Mr. Day thinks. He adds:

"How strange the discord between the largest magazine advertiser in this country and so many of our 'expert' advisers in the publication and agency fields! How curious it is that an advertiser spending huge sums year after year in our greatest publications, should so discount this 'merchandising' of advertising *which in nine new campaigns out of ten is the topic discussed more than anything else!* How archaic is the idea that advertising has anything to do with the consumer! How childishly simple is the conception of advertising which relegates to the manufacturer the role of creating demand among consumers, and which similarly assigns to jobbers and dealers only the task of satisfying that demand *after it has been created.*

"And yet here is a successful advertiser holding this view—and on the other side hordes of disgruntled manufacturers, 'dead' prospects for future advertising; hundreds of advertising agencies grooming new prospects for the 'merchandising' race; scores of publication representatives peddling stories of how the John Jimpson Company last year deceived the jobbers and dealers of its trade into buying twice as much of the newly advertised product as the still newer advertising campaign created demand for. Which picture is the more convincing?

"When the advertising men of this country forget all about 'merchandising the campaign,' refuse to camouflage weak, disjointed and idea-less copy in big space, and refrain from explaining the failures with such high-sounding excuses as 'consumer acceptance' we will have more real advertising successes. There is no dealer of any description in this country who will not gladly carry in stock merchandise for which a large-scale, tangible *demand* exists. How soon will the advertising men realize that they are making the sale of advertising difficult by creating the chimeras of 'merchandising'?"

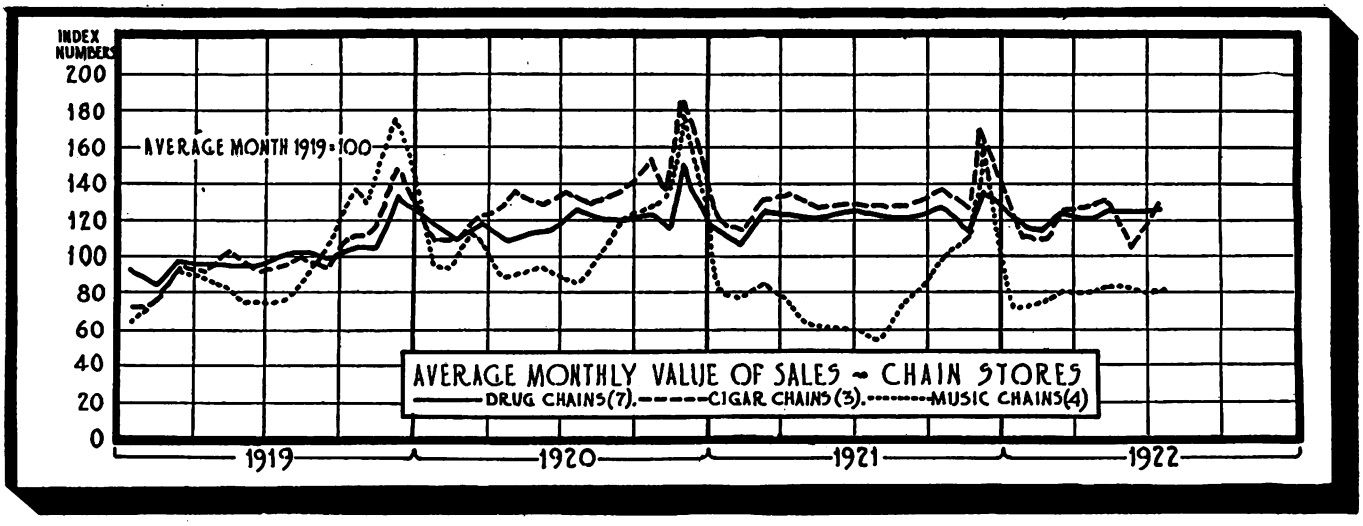
Hints for the Idea Man

DO you watch the news of the day for opportunities to make your advertising timely? Do you keep your eye open for events which will help you to sell merchandise if you tie up with them in your copy?

Just now the college football games play a large part in the news. Yet how many advertisers have kept tabs on the games and adapted their copy to the opportunities which they offer?

One manufacturer who has done so is Pine Bros., Inc., makers of glycerine tablets. "Help the cheer leaders cheer," they said in their copy on the day of the Chicago-Princeton game, "but be sure to take with you Pine Bros. Glycerine Tablets—soothe your throat, stop the tickle and relieve your cough." Roy Dickinson tells in *Printers' Ink* how other advertisers took advantage of this football opportunity:

"The Commonwealth Edison Shop in Chicago advertised that people who could not attend the game might receive returns over the radio, play by play. Hart Schaffner & Marx used in their copy an illustration of two men dressed in



(Magazine of Wall Street)

Business volume of chain stores, 1919-1922, measured by index numbers with 1919 average as 100.

Hart Schaffner & Marx overcoats talking to a player in football togs. In the other big cities where important games were played, the proportion was about the same. The event in which hundreds of thousands of people were tremendously interested had not been thought about sufficiently in advance to allow for the amount of timely copy which might have been thought probable."

Short-Story Advertising

"HOW far can the ad-writer go, in order to gain the reader's interest and sustain it up to the point where the advertising story has been completely told, make use of the methods used by the short-story writer?" asks Eldon C. Harvey, in *Western Advertising*. "No doubt many have asked themselves this question, having in mind the great and increasing popularity of the short story at the present time," he continues.

"It need hardly be said that any copy, whether it be a sales letter, circular, a display on the page of a periodical, or some other publicity medium, if it could come in any way near equaling the short story in gaining the interest of the reader and producing the effect that the short story does on the reader's mind, it would be about as nearly perfect as advertising in this age could hope to be.

"And if an ad-writer could be able to build his copy, as the writer of the short story does, so the readers, after glancing at the title and opening paragraphs, would not only be impelled to read on right through to the end, but while reading would gain a certain definite impression which the writer wished to implant in their minds, almost anybody would agree that such copy, from many points of view, would be about as good as it could be made.

"Let us see how the author goes about building up his story to make it carry out its purpose, or what ingredients are to be mixed into it to make it catch the reader's fancy and produce its effect upon him when he reads it.

"In order to arouse and hold interest, usually the first requirement is that doubt, or wonder, or uncertainty as to the outcome of some situation, be aroused in the reader's mind early in the story. In order to do this, the successful writer arranges his happenings and descriptions so as to gradually increase the reader's curiosity and suspense until the story finally comes to a dramatic climax where the interest is most intense; then comes the *dénouement*, and the mystery is all cleared up in a satisfactory manner, and everything made plain.

"To use a simple illustration showing the effect of a story from the reader's point of view, it might be said that reading the average short story is like climbing up a gradual ascent to the summit of a hill for the purpose of finding out what is beyond. Perhaps the path up the hill is a winding one. It may be easy in places and in others steep and difficult, and the wanderer may have various adventures on his way up. As he nears the top his wonder increases as to what he will see beyond. Possibly he has met other strollers who have told him strange tales of mysterious things or happenings beyond the summit, and as he nears the top he hears strange sounds from beyond, all of which increase his suspense and wonderment. The higher he gets, the more determined he becomes that he will see for himself just what all the mystery is about.

"Just as he is stepping to the summit his interest is most intense, and this is like the climax to a story. Then, in a few moments, comes the *dénouement* and the view beyond the hill is spread out, and the mystery is quickly cleared up.

"Now, coming back to the subject of advertising, the first thing which naturally comes to mind is this: stories are fiction, while advertising copy treats of facts. This, of course, is quite true as a general rule, yet there are few who will not admit that a story of fact can be made quite as interesting as if it were all pure imagination, if it is told in the right way. It all depends upon the skill used in the telling.

"Some of the most dramatic and thrilling short stories ever published could be rewritten without much of anything being left out, and be made about as dry and uninteresting as prohibition speeches. All that would be necessary, usually, would be to rearrange the events backward, and without showing how the happenings affected any person's life or happiness, tell the climax first, explaining how the story ended, then telling in further detail how it all came about.

"On the other hand, some little actual happening can be taken up by a skilful and imaginative writer, who, without adding anything that is untrue, can make it into a story that will touch the hearts of millions of readers. All he does is to tell it in the right way.

"That the plot idea can be used and is actually being used every day by ad-writers, is apparent to anyone who will analyze modern advertising copy. From a few words on a billboard or street-car card to the fifty-page prospectus, the keen ad-writer is using human-interest and mystery-plot methods in presenting his facts and getting them read, believed, and remembered.

"What results he can accomplish and how far the ad-writer can go in this respect probably depend only on his skill and ability. It is at least an interesting matter for consideration."

AUTOMOTIVE

Details Are Now Most Important

EMPHASIS in automobile production is now focused upon small refinements rather than upon broad improvements, in the opinion of *Automotive Industries.*

"Production is passing from its period of radical and revolutionary improvements to a stage of minor refinements of considerable importance," says this trade paper. "Ten years ago a production man might gather some valuable and practical information by a general survey of another plant or by reading a general description of its operating methods.

"Today he must examine intimately the details of operations. To get anything of practical value from his fellow production man, he must discuss mutual problems and ask questions about details.

"Production progress of the next ten years may be equal in importance and efficiency to that of the last ten, but it will be different in character. It will consist of an improvement in a multitude of small matters rather than a few radical changes in major operations.

"Attention must be concentrated upon a closer analysis of production details and a studied effort at small refinement, if production is to make the strides in increased efficiency which will still be demanded of it during the coming decade."

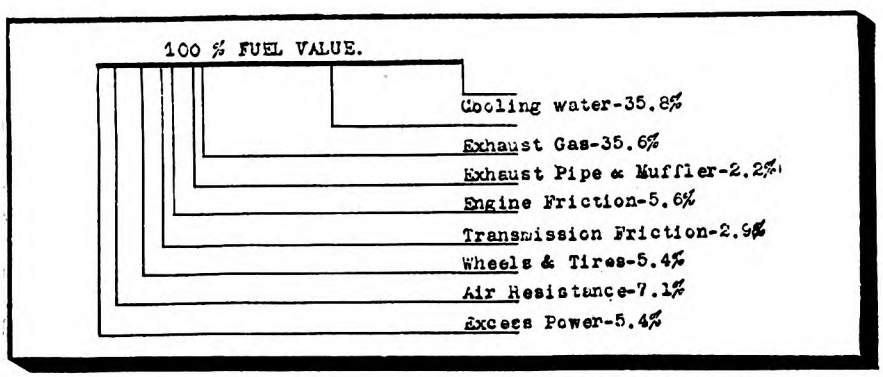
The industry continues to look to the future with great optimism. At the Buffalo convention of the Motor and Accessory Manufacturers' Association, according to the *Accessory and Garage Journal,* the general opinion was that production and sales in 1923 will be larger than in any previous year.

Noiseless Automobile Yet to Be Built. This author gives as his belief, in which most everyone will agree, that the entirely noiseless motor car has yet to be built. He classifies car noises in three groups. In the first he places noises due to present-day construction and which can be eliminated only by changing the principles of construction, as for instance the clashing of gears when changing speed. In the second he places those noises due to improper or imperfect construction, this being correctible by taking more pains, as for instance exhaust muffling. In the third group he places noises due to wear. Obviously the latter are absent in new cars, but high quality materials, well chosen for service and careful workmanship in machining and assembling them, with proper lubrication at all times, are needed to keep them away. He analyzes and comments on each group. E. G. INGRAM, *Motor Record,* 10-22, 1200 w. MAH.

Mass Production. British still want an individual car. Educating market to more pronounced faith in standardized production is goal which Austin motors, among others, has set for itself. Market lags behind plant capacity. Two roads open to British manufacturer: Increase existing market or seek new one. Developed new type of roadster, combining speed and durability of more expensive cars with cheapness and economy of operation of motorcycle. Should have advantage of unique market in England which exists in America only as reflection. Car is 8 ft. 8 in. by 3 ft. 10 in. over all and weighs 650 lbs. Has attained speed of 52 miles per hr. Costs about $900. Company opposed to yearly models. H. OBERMEYER and A. L. GREENE, *Am. Machinist,* 10-5-22, 2000 w. CJW.

New Electric Transmission Provides for Direct Drive. A technical description of the new Spery transmission unit for automotive vehicles. This permits five speeds forward, two reverse and electric braking. Direct drive is obtained by automatic electrically operated friction clutch. The salient features of the new unit are described and illustrated. *Automotive Industries,* 10-12-22, 3200 w. MAH.

Comparing Maximum Pressures in Engine Cylinders. This is a new method, and a very simple one, which has been devised by engineers of the Bureau of Standards, and is being used by them constantly. Then metal diaphragms are mounted in spark plug shells, and then inserted in the cylinder head. By selecting discs of exactly equal thickness, these will fail from equal internal pressure at exactly similar pressures. The time required for failure of these discs is used for comparison. The shells and diaphragms are described and illustrated. STANDWOOD W. SPARROW and STEPHEN M. LEE, *Automotive Industries,* 10-12-22, 750 w. MAH.



(American Automobile Digest)

Diagram illustrating the percentages of the fuel value which are absorbed by the different parts of the car, as shown by a test made on a high-class car traveling at 40 miles per hour. The small percentage of excess power available shows the necessity of keeping all the parts in the best possible condition.

Essentials of a Good Ignition System. Answering his own question, What are the essentials? this author proceeds to give his idea of these. He says reliability, longevity and effect on engine performance are important but engine manufacturer should consider ability of the system to fire the plugs under adverse conditions, also the igniting quality of the spark. He gives the old familiar analogies to water, dilates on the fact that combustion is not due to spark "fatness," derives the electrostatic component of the spark, describes the steepness of the voltage wave front and other qualities. C. H. KINDL, *Automotive Industries,* 9-14-22, 3700 w. MAH.

Lower Power Losses in Cord Tires. The relative importance of the factors governing the loss of power in tires are given, with much supporting data, from which the authors conclude that the lower power losses in cords account for their longer life. This loss is said to increase with increase in load on the tire and with decrease in inflation pressure, and to be proportional to the speed. From the data gathered in the Bureau of Standards tests and others made at Yale by Prof. Lockwood, the authors have deduced a formula for power loss. A number of charts are given, a description of the tests and some of the results, as well as the deductions therefrom. W. L. HOLT and P. L. WORMELEY, *Automotive Industries,* 9-14-22, 2800 w. MAH.

Advantages of Evaporating-Type Cooling System. The system described is one in which the water in the engine is allowed to boil under conditions which will not give the effects of overheating, and to use the radiator as a condenser of the steam formed. It makes use of the latent heat of steam, and is claimed to

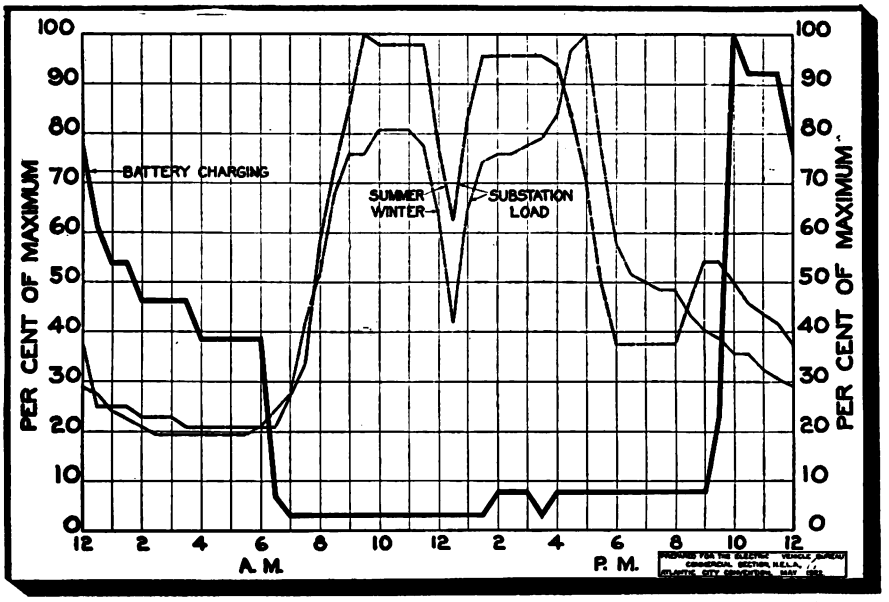
be lighter, more simple and more efficient than either water cooling using thermostatic control on the one hand, or air cooling on the other. Obviously it could not be more simple than air cooling but it could be much more efficient. It is said also to be less likely to permit overheating and loss of water, while it permits the use of a smaller radiator. Author describes the new Rushmore system in some detail, using a number of interesting sketches to help prove the various points made. A. LUDLOW CLAYDEN, *Automotive Industries,* 9-14-22, 3300 w. MAH.

Germans Develop New Motor Plows. The ordinary American tractor is a separate tool, as are the plows which it may pull, but in Europe there are many combination implements made in which the plow or plows are practically an integral part of the tractor and as such are really not detachable. This article describes a number of new German designs along these lines, the showing including the Man 25 hp. two-plow machine combination, Pflader 20 hp. two-plow outfit, the Stumpf 35 hp. four-plow unit, the Mann three-plow device, the Pfannhauser 38 hp. three and six bottom machines, also a number of cable operated combinations. At the Leipsig fair there were seventeen motor plows exhibited as compared with twenty-four tractors. *Automotive Industries,* 9-14-22, 3200 w. MAH.

Talk on Tractor Lubrication. The interesting statement is made that four farming families were required to supply one city family one hundred years ago with the farming methods then in vogue, while today one farming family with modern power equipment can supply four city families, and from the same acreage. This pithy summation of the progress of farming in the last century leads to brief praise of the tractor, and then to the important subject of lubrication. The lubricant itself is explained and those qualities which make it a lubricant. Dilution and its cause are mentioned and suggestions made for combating them. The proper time to change oil is given, and reference is made to the part which incoming dust from the fields plays in tractor lubrication, and how it may be kept out. *The Tractor World,* 10-22, 3250 w. MAH.

Gliders Point Way to Sport Plane Development. Soaring flight experiments have resulted in cutting wing weight per sq. ft. in half, which with very low power would provide low priced, low maintenance sport planes. Author develops this idea, basing same on weight of Hanover (German) gliders which weighed but 400 lb. with pilot. EDWARD P. WARNER, *Automotive Industries,* 10-12-22, 1900 w. MAH.

Showing up Weak Spots in Motorcycle Design. Each year, in England, there is held a six days' motorcycle trial, this being organized under the Auto Cycle Union. This year's distance was 830 miles, but was so generally severe as to hills, road surface and other things as to represent more than 1,000 miles travel. Rain fell on two of the six days. The judges report not only presented the winners but criticized all the machines in the contest, both constructively as well as destructively. The general idea was that the trial indicated marked improvement over any previous trial. Most of the machines were criticized for lack of mudguards and other protection against road dirt. The engines were praised for increased thermal efficiency, but more silent operation is necessary. Many suggestions for improvements were made. M. W. BOURDON, *Automotive Industries,* 10-19-22, 1650 w. MAH.



(N. Y. Edison Co.)

Comparison of the curve for electric vehicle battery charging with the curves for central stations output indicates the advantage of vehicle charging as a central station load.

Propeller Efficiency for Motorships. Propeller efficiency bulks large in any consideration of marine development; in fact, some engineers go so far as to say it is the most important factor. This author gives details of a new system of design and the calculations needed for screw wheels. Using it, better propellers may be expected, and this in turn will be a great boon to Diesel engine builders because the present mechanical efficiency of the Diesel is low. More efficient propellers would raise it, and make it a more formidable competitor of the steam engine and steam turbine. S. E. SLOCUM, *Motorship,* 11-22, 2700 w. MAH.

Diamond Tools in Motor Building. Plan consisted of using an engine lathe, upon the carriage of which was mounted a simple angle-plate fixture, carrying boring bars and driven by a multiple driving head connected to the spindle. The boring bars carried 7 diamond-set tools. Great reason for using diamond tools is to be able to bore holes that do not vary more than 0.0001 in. from the desired size and to have them straight and in line. They can be used very economically in a variety of ways where extreme accuracy is desired. They may also be used for contact points in gages that are subject to much wear. Illustrations of work done are given. G. T. LINTING, *Am. Machinist,* 9-21-22, 800 w. CJW.

New Fuel Feed Uses Oil Pump Vacuum. An oil circulating and vacuum feed system has just been placed on the market, which appears to possess much merit, and this article describes it. It differs radically from other vacuum systems in that the vacuum created by the oil pump is used instead of that from the inlet manifold. The oil pump is operated by the engine, consequently its speed increases with greater engine speed, and the vacuum. That is the greater the engine speed, the greater the vacuum and consequently the greater the fuel feed induced by it. Moreover, it has an additional important feature; it safeguards the engine on which it is used. It operates through the pumping of the oil, if there is not sufficient oil, there will be no vacuum produced, consequently no fuel feed. The units of the system are two in number, a vane type of pump and the tank with its hydraulically controlled valves. *Automotive Industries,* 10-19-22, 900 w. MAH.

Tubing versus Solid Stock for Piston Pins. Author attempts to make a comparison of manufacturing costs of the two methods, using equal qualities of steel. This is difficult because of wide variation in conditions. Tubing costs about four times as much, but makes approximately 30% to 45% more pins. Using exactly equal quality of steel, there is little to choose between the two methods. Using inferior tubing, there is very likely to be built up a public prejudice against tubing piston pins, which will react against all those using tubing. The ease with which the finished product can be sold being a big factor in the final decision as to which method will be used, this public prejudice (or lack of it) may be of prime importance. C. B. FRASER, *Automotive Industries,* 10-12-22, 2300 w. MAH.

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Winter Construction Planned

EFFORTS are being made to stretch construction activity as far as possible into the winter. *The American Contractor* says that contractors everywhere are figuring bids on work to be done during the snowstorms.

Winter building is quite practicable, this magazine says, but contractors must make careful plans for it if they are to be successful.

"For more than ten years winter construction has been successfully carried on by leading contractors," it adds. "They have successfully demonstrated that though icicles gather around a job, progress can still be made. The contractor unacquainted with winter work must remember just one thing: He must be prepared.

"The basic principles of winter construction have been evolved. Technical details may be gleaned from a number of sources. It is the particular layout of each job that will call for ingenuity in the contractor's office.

"The layout of the job equipment has always been a decisive factor in efficiency and the securing of a profit. In winter construction it becomes much more important because there must be more care in the handling of materials. They must be heated and covered, and mixed with warm water for concreting. Handling processes, therefore, run into money unless the equipment is laid out to do the work efficiently."

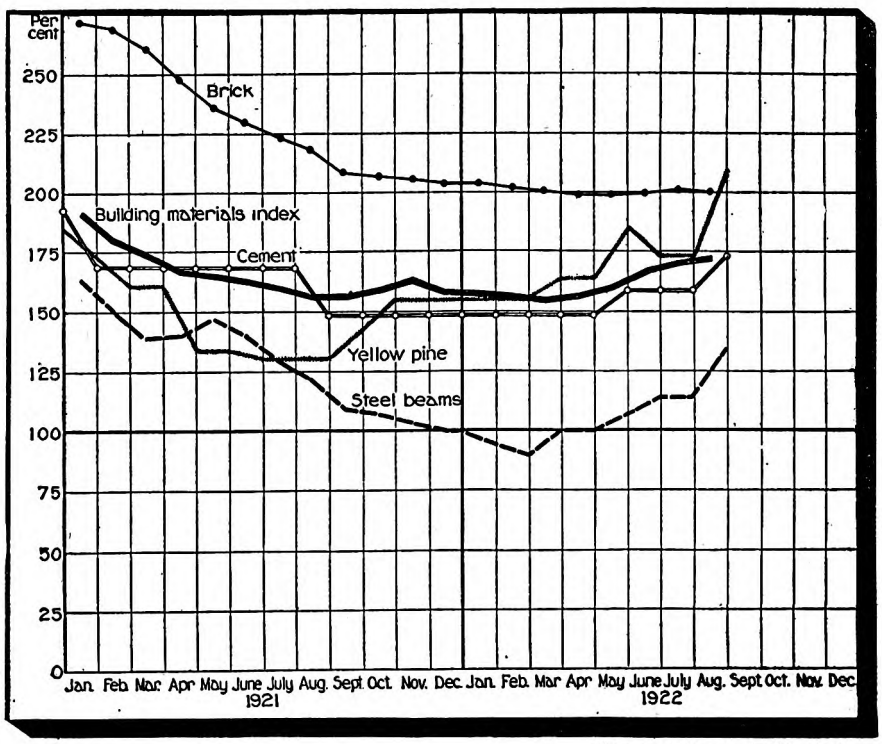
In Philadelphia, according to the *Public Ledger*, several campaigns have been started to extend the building season and thus minimize unemployment and the waste of materials. Surveys are being made by the Philadelphia Building Congress, with a view to getting cooperation among the several elements in the industry and arranging a program to help matters.

In New York excavating work is going ahead at a rate greater than is usual at this time of the year. In the opinion of the editors of *Dow Service Building Reports*, this means that much work which ordinarily would have been postponed until the spring will be carried ahead during the winter. Two contributory reasons are assigned to the winter activity. First, the scarcity of human labor has led contractors to install machine construction methods which can be operated in colder weather than methods which require more workmen; and second, money conditions are considered easier now than they are expected to be during the spring.

Co-operative Ownership of Apartment Buildings. Part II. Covers promoting and financing co-operative projects, giving various forms of contracts and financial arrangements, with methods of working out pro rata cost of building, land and profits. C. STANLEY TAYLOR, *Arch. Forum*, 10-22, 2000 w. CS.

Architect and Advertising. Discusses practice—often termed pernicious, but very consistently condemned in our country, extensively and even successively practiced in Europe—of advertising his wares and services in manner popular in other lines. SIR CHARLES T. RUTHEN, *Arch. & Eng.*, 10-22, 600 w. CS.

Plea for Architect's Interest in Fabrics. Covers interior effects produced by fabrics. It is matter of common observation that no matter how well designed an interior may be, it remains hard and cheerless until introduction of an element that yields to the touch, and by its appearance tells that it is not part of the structure but a live texture, bearing color and design. Gives description and illustrations of various fabrics and their construction. HORACE MORAN, *Arch. Forum*, 9-22, 2000 w. CS.



(Harvard Economic Service)

Relative prices of building materials, 1921-1922. (Prices in 1913=100.)

Report on Building and Farmstead Engineering. Covers activities of Delhi State Land Settlement, Cal. They embrace planning, designing, quantity surveying, obtaining competitive bids, letting contracts, supervising construction of all classes of farm, townsite and administrative buildings, making individual farmstead layouts for settlers, determining location and arrangement of buildings, etc. MAX E. COOK, *Arch. & Eng.*, 10-22, 1000 w. CS.

Material and Construction Costs. Part XIII. Covers flooring. Floor covering may be divided into two general classes: (1) Monolithic, where material is prepared, mixed and applied on job; (2) Sectional, in which material consists of complete and finished units brought to the job. Gives description of types of each class, specifications, measurements, with table of costs of labor and materials. THEODORE F. LAIST, *Construction Economist Edition, Am. Contractor*, 10-21-22, 2500 w. CS.

Galvanized Steel Reinforcing Fabric as a Permanent Stucco Base. Description of development and use of galvanized steel reinforcing fabric as base for stucco and plaster which has real economic merit and satisfactorily takes place of highly inflammable wooden lath. Illustrated. TILLMAN G. VAN GUNTEN, *Permanent Builder*, 9-22, 1500 w. CS.

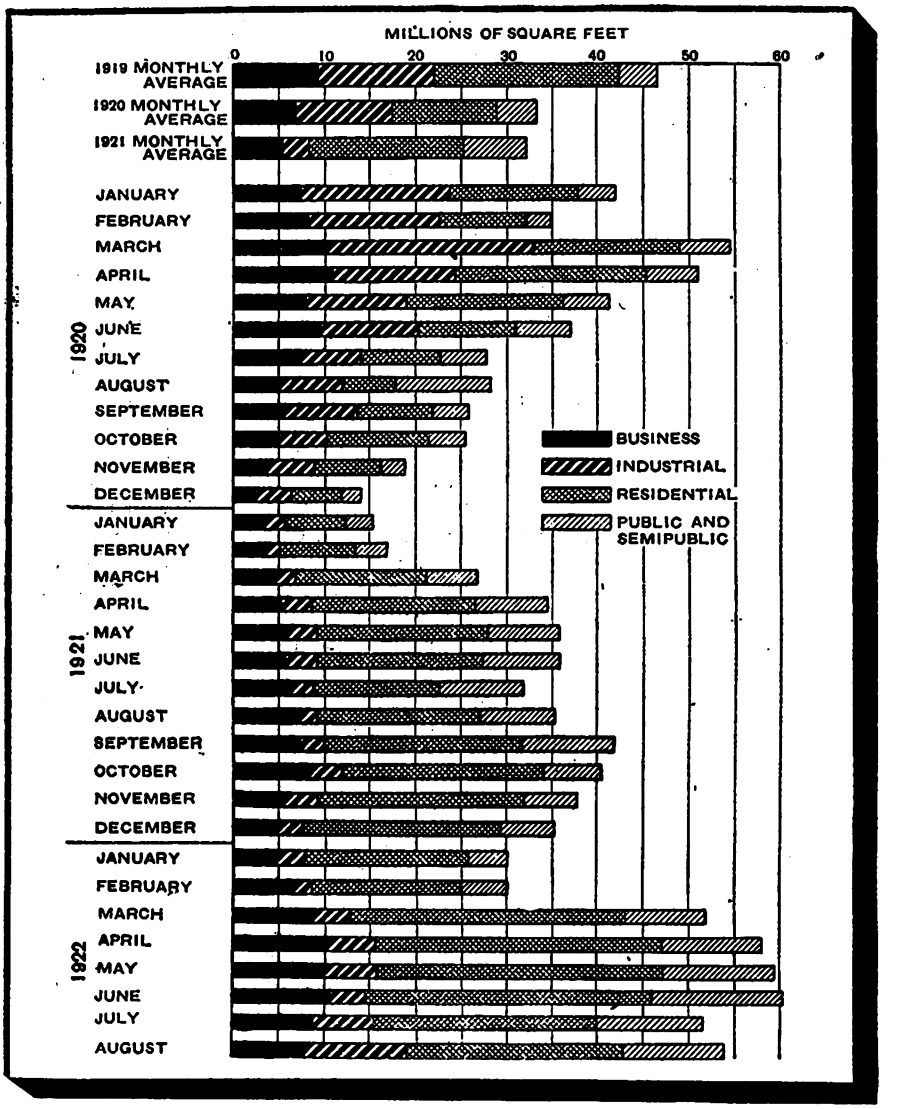
Railway Shops. Comprehensive study by committee of large number of exist-

ing layouts and discussion of best arrangement of shops, yards, and machinery. All buildings should be substantially built (fireproof construction preferred), well lighted, comfortably heated and have good ventilation. 200 sq. ft. per car is fair average for moderate size property operating 45 ft. cars. Advantages of ladder tracks and transfer tables. Fire protection and prevention. Details of design. *Electric Traction*, 10-22, 2000 w. Illus. CJW.

Lost Time in Construction. Part III. Rain and Mud Delays. Analyzes delays and enumerates remedies. Discusses possibilities of drainage, machine design, trackways, housing, waterproofing, drying. Problem calls for research, and following questions must be answered specifically and quantitatively: (1) What percentage of working season is wasted because of time lost caused by rainfall and its consequences? (2) What is loss, represented by delays in construction, caused by rain? (3) What means are practicable of reducing delays due to rain and what amount do they add to cost of construction? C. S. HILL, *Eng. News-Record*, 10-19-22, 1400 w. CS.

Concrete Construction. Part III. Types and Limitations. Describes three types—slab, beam and girder; flat-slab or mushroom; and ribbed floor. Concrete excels other materials in permanence and fireproof qualities. For ordinary commercial construction it requires only half as many columns as wood, and is materially less expensive than steel. With heavy loads it is cheaper than wood. Steel costs less only in very tall buildings and where live loads are very light and spans long. In appearance concrete can be made satisfactory for all but monumental work. WALTER W. CLIFFORD, *Arch. Forum*, 9-22, 2000 w. CS.

Department Store Ventilation. Discusses fundamental principles of ventilation. Drawing to show application of these principles. Application contemplates air introduced from roof through central shaft, with arrangements for recirculating in winter and for doubled air flow in summer for cooling, with all air flow at room temperature from shaft to points of greatest heat losses, with all air cleaned, freshened with ozone and warmed at each floor, so that different temperatures may be carried within limits, with no air handled through ducts after cleaning and freshening, with automatic temperature regulation, and finally, with provision for maintaining spaces above freezing, without operation of fans, for protection of sprinkler system and plumbing, during periods outside of service hours. J. M. ROBB, *Heating & Ventilating Mag.*, 10-22, 1500 w. CJW.



(Bureau of the Census)

Volume of building contracts awarded by classes, by months since 1920

Floodlighting the Exteriors of Buildings. Brief account of some of best installations and notes on cost and value of this means of display. Covers: Edgewater Beach Hotel and Wrigley Building, Chicago, and Woolworth Building, New York. C. E. JOHNSON, *Bldgs. & Bldg. Management*, 10-16-22, 600 w. CS.

Residence Lighting. Based upon result of detailed survey of lighting in middle-class home, averaging about 1500 representative homes from number of cities. Aim was to obtain detailed view of lighting and wiring conditions in wired home to show deficiencies. Survey reveals effect of rental and ownership on wiring and lighting equipment. Deficiency in wiring is chiefly found in the cases of convenience-outlets and outlets for brackets. The deficiency in lighting equipment is chiefly found in the case of shades, wall-brackets and portables. In general the watt per socket should be increased somewhat but chief need is increase in number of sockets. From 12% to 38% of wall-brackets, depending upon the room, were found without shades and from 7% to 21% of the ceiling fixtures had no shades. The wiring and lighting equipment of the low-class home is very much inferior to that of the middle-class home. From standpoint of an adequately and properly wired and equipped average middle-class home the average wired home today might be said to be less than "half-lighted." M. LUCKIESH, *Central Station*, 10-22, 4500 w. CJW.

Central Vacuum Cleaning Systems. Many advantages to central vacuum cleaning system for building when properly installed. Has been determined that proper method of measuring cleaning value of any machine is to have definite vacuum at end of hose lines, where cleaning is being done and under cleaning conditions. When cleaning carpets a high vacuum and small volume are necessary, and for bare floors a lesser vacuum and greater volume are necessary. Three types described—multi-stage turbine, single-stage turbine and double-impeller. Important that installation be given consideration when plans are made. Curve given for determining proper pipe sizes. Piping should be either black iron or mild steel, and all fittings of long turn, recessed drainage type. Specifications for tests given. E. J. SKILLMAN, *Arch. Forum*, 9-22, 1200 w. CS.

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Manufacture of Sand Lime Brick

THE extent to which the sand-lime-brick industry declined last year is revealed in the report of the census of manufactures just made public by the United States Department of Commerce.

The total value of products reported amounted to $1,116,797 in 1921 and to $1,663,052 in 1919, a decrease of 32.8%.

Six establishments, with products valued at $315,605, which reported at the previous census, are not included in the 1921 figures for the following reasons: Three were out of business; one was idle, and two had changed the character of their products and were assigned to other industry classifications. Of the 25 establishments reporting for 1921, seven were located in Michigan; two each in Florida, Indiana, Minnesota, New York, and Wisconsin; and one each in Georgia, Louisiana, Massachusetts, Ohio, Pennsylvania, South Dakota, Tennessee, and Texas.

The decrease in production has been accompanied by decreases in the number of persons employed, in the total amount paid during the year in salaries and wages, and in the cost of materials used.

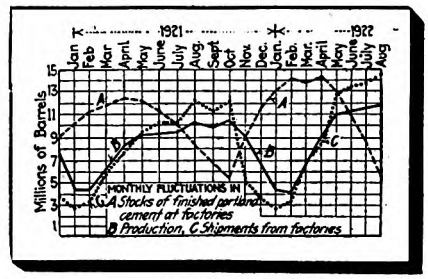
There was considerable fluctuation in the monthly employment of wage earners in 1921. In October, the month of maximum employment, 449 wage earners were reported; and in March, the month of minimum employment, 257; the minimum representing 57.2% of the maximum. The average number employed during the year was 349 in 1921 as compared with 504 in 1919. A classification of the wage earners with respect to the prevailing hours of labor in the establishments in which they were employed shows that for 68, or 19.5% of the total (average) number, the prevailing hours per week were 48 or less; and for 260, or 74.5%, the hours per week were from 54 to 60 inclusive.

The combined output of all establishments was only approximately 49% of the maximum capacity, based upon a demand requiring full running time.

Asphaltic Cement Specifications. Importance of rigid specifications governing asphaltic cement is oftentimes given too little consideration, due, perhaps, to fact that average sheet asphalt pavements contain only about 10% to 11%, by weight, of bitumen. Gives some worthless tests required in some specifications, and evils of closed specifications. Only specifications necessary, so far as bituminous materials are concerned, are for asphaltic cement itself, and those governing flux oil where refined asphalt is being brought to proper consistency. Gives tests for asphaltic cement and flux oil. GENE ABSON, *Municipal & County Eng.*, 9-22, 1500 w. CS.

Colorimetric Test for Concrete Sand Studied. Limitations found in standard test for organic impurities in studies by Bureau of Public Roads. Colorimetric test for organic impurities as made at present on concrete sands gives only an indication of where trouble might be expected and should not be used as a positive factor in judging sands except in those localities where experience has shown it to be of undoubted reliability. CHARLES E. PROUDLEY, *Eng. News-Record*, 10-12-22, 600 w. CS.

Concrete Proportioning Theories. Proper use of available aggregates to produce definite quality of concrete is constant source of worry to engineer. Use of excess mixing water, beyond that needed to result in concrete which is practicable to place, may reduce strength to less than 50% of that which might be obtained. This may be tested by use of slump test and flow table. Discussion of these tests. Followed by discussion of various theories, such as arbitrary volume proportions, void method of proportioning, Fuller's theory of maximum density, surface area theory, water-cement ratio theory, etc. Safe to say that desired standard of concrete quality can be obtained and maintained only by cooperation between the testing laboratory and the field engineer, coupled with observation and experience. Concrete will never be uniform but there are no reasons apparent why many of the uncertainties now involved cannot be completely eliminated. G. M. WILLIAMS, *Engineering J. of Canada*, 9-22, 3000 w CJW.



(Engineering News-Record)

August cement output and shipments were heavier than July. Production in the U. S. during August, according to Geological Survey, totaled 11,664,000 bbl., an increase of 107,000 bbl. over preceding month. Shipments amounted to 14,361,000 bbl. or 511,000 heavier than July.

In the study of the heat treatment of fillers, being made by the Bureau of Mines at the Southern experiment station, Birmingham-Tuscaloosa, Ala., gravity determinations have been completed on 12 samples of clay, through the full range of temperatures. These tests show practically the same characteristics: an increase at 300° C.; a slight decrease at 400° C., and an increase at 500° C.; a sharp decrease at 750° C., and a corresponding increase at 1000° C. Determination of loss in weight shows the greatest loss accruing between 500° and 750° C. and a slight loss between 750° and 1000° C. This is noteworthy, as both the true and apparent specific gravity show a decrease at 750° C.—*U. S. Bureau of Mines.*

Production Costs of Rock Products. Part I. In general, the producer prefers low price level, for volume of trade with its attendant economies is much better than restricted sales at excessive prices. Covers advantages resulting from low production costs, and resulting benefits to consumer, producer, home building, public works, and highway construction. OLIVER BOWLES, *Rock Products*, 10-21-22, 1200 w. CS.

Rift and Grain in Granite and Their Origin. Rift is an obscure microscopic foliation, either vertical or horizontal, along which the granite splits more easily than in any other direction. Grain is a foliation in direction at right angles to rift, along which the rock splits with facility second only to that of fracture along rift. Covers different views of rift and grain and history of formation. T. NELSON DALE, *Stone*, 9-22, 1500 w. CS.

Handling Brick. Operations in average brickyard are particularly adapted to successful application of mechanical handling equipment. Basic raw materials are few in number and are received in great bulk. Finished product is uniform in shape and weight. Large majority of plants have failed to take any advantage of mechanical equipment. Description of equipment at American Enameled Brick and Tile Co. The partial application has resulted in increase of 20% in number of brick handled. G. L. MONTGOMERY, *Chem. Met. Eng*, 10-11-22, 2000 w CJW.

Screens for Washing Plants. Part I. Discusses right and wrong uses of stationary screens, and principles on which they work. This part covers screening principles, pitch and fabrics. EDMUND SHAW, *Rock Products*, 10-21-22, 2000 w. CS.

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GLASS · POTTERY

Labor Stops Prosperity Special

THE pottery industry presents an excellent example of the manner in which unexpected labor trouble can upset an industry just as it is about to shake off depression. The strike in that trade came just at a period when everyone was ready to go ahead at full blast, and the union succeeded in tying up the generalware trade with great effectiveness.

"It did appear to those who have been making a deep study of the American pottery situation during the last year, that both manufacturers and employees were beginning to 'sit pretty' when the vote to strike carried by 218 votes," says M. K. Zimmerman in the *Crockery and Glass Journal*. "The coal strike had been adjusted, and this was in the way of business progress early in the year. Then came the rail strike, and eventually this situation was cleared away also. And then came the tariff issue. This also was cleared away, and the 'clear track' signal did seem to be shining from the business tower.

"Good business began to pour into the offices of the different potteries in the generalware industry. There was no fuel scarcity, and the roads were making reasonably prompt deliveries. Manufacturers seemed to be exerting every effort to go ahead steadily, and a boom period, perhaps better and more healthy than that experienced during the war period, seemed at hand.

"Then, like a flash from a clear sky, came the vote to strike. Manufacturers did not believe the vote would show the result it did. Many workers did not vote because they also did not believe their vote would be required to avert a strike."

The potters lost the Christmas business because of the strike, and then settled down to what they expected to be a protracted struggle. The only persons who are benefiting are the foreign potters, especially the British, who were thrown into gloom by the passage of the tariff act, only to be restored to good spirits by the strike.

Annealing Glass. If glass is allowed to cool rapidly through certain temperature zone no devitrification takes place. It must then be carefully and slowly cooled through lower range, depending upon composition and nature of the glass. Devitrification important factor in manufacture by automatic machines. Most danger from improper annealing lies in poor construction, lack of operating knowledge of the lehrs and kilns and too much guesswork. Intelligent use of polariscope eliminates much of this trouble. Dangerous temperature conditions in lehr consist in maintaining maximum and even temperature at receiving point; must be taken into consideration that this point must be below devitrification point. Rate or movement and fall in temperature through critical annealing period depends somewhat upon mass of article to be treated. In fine annealing of glass after having been roughly tempered in lehr temperature limits of devitrification and of annealing must be known and adhered to. H. W. HESS, *Glass Worker*, 9-16-22, 750 w. CJW.

Gauge Glasses. Annealing important but certain conditions demand special treatment, such as where glass is subjected to great temperatures and sudden changes of heavy shock and strain under these conditions of high temperature. This treatment requires careful study of strains and manner in which they are produced. Boiler gauge glass cut to length on wheel with wet abrasive and ground on wet stone stands up better than same piece of glass annealed. Need of healing by fusion of microscopic cracks caused by cutting with wire or wheel depending upon local frictional heat. Heat treatment consists in heating glass to 1300° F. (or other suitable temperature) and cooling very rapidly and evenly in the air and allowing it to become naturally strained. H. W. HESS, *Glass Worker*, 9-30-22, 750 w. CJW.

Magnetic Separation. Iron content of our ceramic material somewhat high. Iron particles introduced in grinding. Process iron (bolts, nuts, nails, etc.) is introduced at point of origin and en route to plant. Iron in batch not only discolors molten glass, but forms huge mass on lining of furnace. Magnetic separator will extract this iron. Apparatus needed for both wet and dry work. Most common machine is one through which slip is allowed to flow and where iron accumulates upon projecting pole pieces. HIRSCHBERG, *Glass Worker*, 9-30-22, 1400 w. CJW.

Sandstone. St. Peter sandstone furnishes much of silicia used in glass making, in glazes, for sawing, roofing, foundry, porcelain, etc. Deposit varies from 115 to 275 ft. in thickness. First broken up with dynamite and allowed to weather during winter. Water then directed against sand, washing it into sump. From here sand is transferred to another sump by steam created vacuum. Then screened, washed and if necessary ground. W. T. CHRISTINE, *Cement, Mill and Quarry*, 8-5-22, 2000 w. CJW.

Talc as Flux. Magnesium oxide has some possibilities as partial or total flux in high tension insulator porcelains. To be practical for this purpose it must be introduced into the body through some cheap material that will not make a large percentage of calcine necessary. Talc seems to fulfil these requirements better than any other source of MgO more commonly used. Results at cone 10.5 indicates that a small addition of talc greatly decreases the percentage of feldspar necessary for vitrification, additional small amounts of talc have much less effect than the first small additions, and that, in properly vitrified bodies, the addition of the MgO at the expense of the K_2O within the limits tested tends to increase the transverse strength. Vitrified bodies of this general type show little improvement, if any, over regular triaxial porcelains. ROBERT TWELLS, JR., *J. Am. Ceramic Soc.*, 10-22, 10 pp. CJW.

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Preparation of Clay and Minerals for Ceramic Purposes. Term "clay" denotes surface earths, chief characteristic of which is plasticity when wet and has property of baking to hard stone-like mass when heated to full redness. Covers two classes of clays: residual and sedimentary; excavation and tempering; grinding in wet pans; preparation of china clay; pumping sludge; and squeezing out moisture. G. D. DICKEY, *Cement, Mill & Quarry*, 10-5-22, 1000 w. CS.

How Flower Pots Are Manufactured. Old-fashioned and modern methods described, with types of machinery, clay and equipment necessary. Flower pots must be burned hard, have thin walls, be porous, have hole in bottom and smooth inside walls. Clays which are easily workable and burn hard at comparatively low temperature are well suited for purpose. Manufactured in three ways: by means of foot or power operated jigger, by using plaster of paris forms and turning on jigger, and by means of flower pot presses. Each method described and illustrated. Also covers drying and burning. Translated from the German. *Brick and Clay Record*, 10-19-22, 2000 w. CS.

Fireclay Refractories. Outline of plant operations at Evens and Howard Fire Brick Co., St. Louis. Raw material consists of Cheltenham plastic fireclay and flint clay. Operations discussed under headings: grinding, grog and calcine, forming fireclay refractories, machine-made firebrick, waste heat driers, hand-made brick, burning, fuel and power. Illustrated. A. G. WIKOFF, *Chem. Met., Eng.*, 9-6-22, 2800 w. CJW.

Gypsum. Southern California contains literally millions of tons of commercial rock gypsum. Used as land plaster, retarder for cement, wall plaster and wall board. Four types of deposits: efflorescent, periodic lake, interbedded and crystallized veins or selenite. All but selenite have local value. Distribution. General properties of gypsum. M. A. NEWMAN, *Cement, Mill and Quarry*, 8-5-22, 1200 w. CJW.



Progress in Synthetic Chemical Industry

FIFTY-ONE coal tar therapeutic agents, most of which were manufactured in this country for the first time last year, are now being regularly produced by the chemical manufacturers of the United States. In this branch especially the American synthetic organic chemical industry is making excellent technical progress, and is laying good foundations for the future.

"In variety of product, in extent and value of output, this phase of the new American chemical industry has scored a number of triumphs and proved to the world that American chemists have successfully established here some of the most difficult and complicated synthetic processes," says the *Chemical Color and Oil Record.*

The output in 1920 amounted to 2592 tons, which fell in 1921 to 773 tons. The sales in 1921, however, totaled 938 tons, valued at $2,930,324. In point of value, aspirin, or acetylsalicylic acid, heads the list. The five American producing firms manufactured 367 short tons as compared with 854 tons in 1920. The sales were 468 tons, valued at $686,264. The average price per pound has receded from $5.49 in 1917 to 73 cents in 1921. Sodium salicylate suffered less of a reduction; the output in 1920 was 205 tons; in 1921, it fell to 160 tons. The sales during the year reached 176 tons, valued at $100,968. Six firms are now engaged in the manufacture. The price was 56c per pound in 1919, which fell to 29c in 1921.

Chemical markets as a whole continue firm. According to the *Textile World,* healthy activity along routine lines continues to be one of the outstanding characteristics. Heavy chemicals are still the recipients of the greatest interest, and prices have been well maintained.

Phenylglycine-o-carboxylic acid. This chemical is an important intermediate step in the preparation of indigo from naphthalene. The proper conditions for the reaction between anthranilic acid and chloroacetic acid, including the concentration in water of the reacting substances, time of reaction, ratio of the two components, condensing agent and temperature, have been determined. The use of an alkali carbonate as a condensing agent gives a better yield of the acid than an equivalent amount of an alkali hydroxide. H. L. HALLER, *J. Ind. Eng. Chem.,* 11-22, 2500 w. CJW.

Acetaldehyde. Discussion of manufacture from acetylene, using as catalyst a dilute acid containing mercury salts and working at comparatively low temperatures and at pressures as little above atmospheric as possible. The yield is almost theoretical. The process is continuous in every respect and may be carried out easily and conveniently on a commercial scale. H. W. MATHESON, *Chemical Age,* 10-22, 1000 w. CJW.

Tetra-oxyanthraquinones. These compounds have valuable property of dyeing good colors on metallic mordants. Only few isomers have industrial application. The acetates, which melt lower than patent compounds, are used for identification. Physical properties and color of acid and alkaline solutions given. *Color Trade J.,* 10-22, 800 w. CJW.

Oxidation of Ammonia. Study of the fundamental conditions involved in the catalytic oxidation of ammonia. The problems studied were the loss of fixed nitrogen at the gauze, the effect of small percentages of iridium in the platinum gauze, the electrical heating of the gauze, oxidation with double gauzes and the use of ammonium nitrate solution in absorption towers. Among the unsolved problems are: more economical use of platinum catalyst; non-platinum catalyst; use of multiple gauzes; relation of ammonia content of gas, gauze temperature rate of flow of gas through gauze and ammonia oxidation efficiency; increasing the oxygen content of the gas mixture ahead of the gases; apparatus for the continuous analysis of gas mixtures and catalysis of the oxidation of nitric oxide to nitrogen peroxide. H. A. CURTIS, *Chem. Met. Eng.,* 10-4-22, 3500 w. CJW.

Story of Helium. Helium, because of its property of non-inflammability, is used extensively for monster dirigibles, exists in atmosphere we breathe in proportion of one part in 185,000. Story is one of romances of science, probably nothing, except radium, compares with it in human interest. It is one of best examples of discovery in pure science having wide commercial application. First observed during eclipse of sun in 1868. Called "helium" from Greek word "Helios," the sun. In manufacture, object is to liquefy all elements making up natural gas except helium, which does not liquefy at temperature used. After liquefaction of all other constituents in the gas the helium can be pumped off. Gives description of present plants and production. R. B. MOORE, *Cement, Mill & Quarry,* 10-5-22, 1000 w. CS.

Carbon Black. Carbon black is product resulting from incomplete combustion of gas and is deposited by actual contact of flame upon metallic surface. Not recommended the gas be used for manufacture of carbon black where adequate market for gas for domestic purposes is available. Very complete summary of methods of manufacture, including channel process, small rotating disk process, plate or Cabot process and roller or rotating cylinder process. Physical tests include tinting strength, color, grit, hiding power and spreading rate. Chemical tests include moisture, ash, acetone extract. Specifications are given for printing ink, rubber, paint. Developmental work should probably not endeavor to improve present process but should investigate entirely new methods, as, for example, decomposing of gas or of other hydrocarbons in absence of air. Very useful treatise to manufacturer or user of carbon black. R. O. NEEAL and G. ST. J. PERROTT, Bureau of Mines, Bulletin 192. 95 pp. (1922). 25 cents. CJW.

Calcium Arsenate Tests. Two very important series of tests have been carried out with calcium arsenate on the boll-weevil under directions supplied by U. S. Dept. Agr. Outcome of 302 tests has been complete vindication of this method of control in the Southeast. Enough cotton can be saved to make its use profitable. Rules for application are easy enough to follow and it now remains to educate the farmer to a willingness to adopt the calcium arsenate method. C. A. WHITTLE, *Am. Fertilizer,* 10-21-22, 600 w. CJW.

Solvent Extraction. Advantages are higher yields of vegetable oils, freedom of oil meal from objectionable rancidity, lower refining losses from extracted than pressed oil; problems for study include proper solvent for certain oils, effect on color and taste of oil if hulls or shells are present during extraction, effect of metal of extractor on finished product, etc. "Future of vegetable oil industry lies in adoption of extraction process." C. F. EDDY, *Jour. Ind. Eng. Chem.,* 9-22, 750 w. CJW.

Local Anesthetics. Discussion of the search for substitute for cocaine (that is synthetic organic compounds). These include procaine, butyn, anesthesin, benzyl alcohol, and others. Of interest to the manufacturers of pharmaceuticals as well as to the research worker. HENRY GILMAN, *J. Ind. Chem.,* 9-22, 2500 w. CJW.

Test for Useful Solvents. It is often desirable to determine without exposing a valuable firearm to possible corrosion whether a solvent is useful or not, states the United States Bureau of Mines. For this purpose a soft steel plate may be brightened with emery paper and rubbed with potassium chloride. The oil or solvent should then be used as directed, with special care not to dislodge mechanically the salt from direct contact with the steel. The plate should then be exposed to a saturated humidity for not less than a week. Only those processes that give complete protection should be employed on the bore surfaces of the firearm.

Refining Crude Glycerine. Refining process consists in neutralizing fatty acids with alkali, distilling and subsequent bleaching to obtain desired color. Two general systems, open and closed. Open system one in which glycerine and sweet water are removed from the distillation unit in order to concentrate to the desired glycerine content. In the closed system the dilute glycerine is concentrated directly in the concentrator which is an integral part of the distillation unit; the sweet water is concentrated in the sweet water evaporator to sweet water crude or it may be concentrated in a separate evaporator. Chief advantage of closed system is fact that the amount of glycerine condensed is easily controlled. Description and method of operation of both systems. In bleaching some medium as bone black is used, both for removing coloring matter and to give press cake so that fine particles of impurities will not pass through press cloth. Glycerine is circulated through filter press until satisfactory product is obtained. Temperature of slightly less than 170° F. is maintained. About 1 lb. bleach is used for each 1000 lb. distilled glycerine. Outline of complete method of treatment of glycerine from salt crude glycerine. W. E. SANGER, *Chem. Met. Eng.*, 10-25-22, 3500 w. CJW.

Creosote Oils. It has been found that the percentage of coke in an oil as determined by the coke-bulb test is subject to variations over undesirably wide limits, owing to unavoidable variations in test conditions, and that a crucible test wherein the percentage of coke is calculated from a fixed carbon test on the residue of the oil remaining after a retort distillation to 355° is better than the bulb tests. Advantages and method of operation given. C. S. REEVE and F. W. YEAGER, *J. Ind. Eng. Chem.*, 10-22, 1500 w. CJW.

Acid Recovery in Oil Refineries. Cast iron still with lead cover largely used. Improvements over original design adopted from chemical industry consists in use of large stills, cast-iron covers, small, packed, heat-exchange tower to which fumes from stills are taken by slight suction and condensed by contact with cold acid being fed into system. Organic matter decomposes acid and produces mist, creating undesirable working conditions. Description of Skinner tower concentrator, designed to overcome objectionable features of above. Four towers; one for weak acid, one for bringing partially concentrated acid to 66° Be, and two for condensing fume from second tower. Method of operation. Tower packing consists of brick which do not take up solids from acid and obstruct the draft. Tower layout for producing 25 tons 66° Be. acid per day will cost about $40,000. L. B. SKINNER, *Chem. Met. Eng.*, 10-11-22, 2000 w. CJW.

Rancidity of Fats. Fats, even when kept in contact with metals, exposed to light and at summer temperatures, did not become rancid provided that air was excluded. Passage of carbon dioxide, presumable air-free, did not prevent its development. An atmosphere of oxygen hastened the production of rancidity more than air alone. Contact with metals hastened production of rancidity; this action was independent of the corrosive action of the fat upon the metal. Light was necessary for the development of rancidity in fats exposed to air, but not in contact with metals, but fats stored in contact with metals developed rancidity even when protected from light. Moisture appears to be a negligible factor, at least in comparison with the other factors discussed. J. A. EMERY and R. R. HENLEY, *J. Ind. Eng. Chem.*, 10-22, 5000 w. CJW.

Lemon Residue. Destructive distillation of lemon residue, after juice has been pressed out, yields (based on wet pulp) 6 lbs. acetic acid, 4 lbs. methyl alcohol and 0.3 lb. acetone, value, at present prices, 95 cents. Thus it is not profitable to carry out such a distillation. Charcoal and tar seemed to possess no valuable properties. H. D. POORE, *Chemical Age*, 10-22, 1400 w. CJW.

Radioactivity of Waters. From the experience of the Bureau of Chemistry in analyzing commercial bottled waters of natural origin and from published data, it may be concluded that shippers of these products are not justified in making any statements on the labels which will induce prospective consumers to purchase the articles because of their radio-activity. W. W. SKINNER and J. W. SALE. *J. Ind. Eng. Chem.*, 10-22, 1000 w. CJW.

Chemical Control in Fertilizers. Survey of past experimental work on fertilizers, showing that the field is a broad one, that many influences affect the results and that as we enlarge our field of knowledge by new additions, we are brought into contact with an ever-enlarging circle of the unknown, offering still greater and endless volume of new, interesting and useful problems for solution. Discusses adaptability of plants, effect of lime, residual fertilizer effects and crop influence on following crops. H. J. WHEELER, *Am. Fertilizer*, 10-21-22, 1600 w. CJW.

Correctly Applying Fertilizers. Methods of applying fertilizers may not only reduce their effectiveness but may completely annul it and do serious damage besides. Most harmful location of fertilizer is in direct contact with seed. If strip of fertilizer is separated laterally from seed by only one-half inch, at least 10 times as much fertilizer can be applied as when it is placed in direct contact with seed. Mixing fertilizer with soil is beneficial to extent to which it distributes the fertilizer laterally. Separation from seed by soil layer of one inch or more is not effective on account of movement of fertilizer solution by rain or capillary action. Fertilizer tolerance of crops. E. J. PRANKE, *Am. Fertilizer*, 1500 w. CJW.

Sugar Formation in Sulfite Digester. Rate of sugar formation is influenced chiefly by temperature and concentration of free sulfur dioxide. Time is also a factor since prolonged cooking increases the sugar production but at the expense of the cellulose. E. C. SHERRARD and C. F. SUHM, *J. Ind. Eng. Chem.* 10-22. CJW.

Perfumery Raw Materials. Prices of natural perfumery products have been much reduced. Some of the causes and results. Lower prices have always had tendency to eventually make extremely high prices or cause great scarcity of goods. Increased personal demands do not indicate continued low prices. Greatest stabilizer of market prices of natural raw materials that perfumer has to employ in the future will be the coordination of knowledge of the perfumer and the chemist, and then cautious consideration of the cause and effect by the man who does the purchasing. B. T. BUSH, *Am. Perfumer*, 10-22, 1000 w. CJW.

Essential Oils in Desert Plants. Large number of desert plants contain essential oils. Appear to serve as protection against sudden changes in temperature and excessive evaporation. M. ADAMS, *Am. Perfumer*, 10-22, 750 w. CJW.

Gelatin in Photography. The fundamental process in modern photography consists in making negatives and positives with gelatino-silver bromide emulsions. The series of operations consists in: making and coating the emulsion, exposure to light, development, fixation, washing, drying, with auxiliary operations such as hardening, reduction and intensification, toning and tinting. For the preparation of the emulsion, the freedom of the gelatin from desensitizing impurities, its relative content of jelling protein and nonjelling hydrolysates, the viscosity of its sols and their setting points are important. The factors governing the viscosity are discussed in the light of recent work. Exposure is determined by sensitiveness, which again is largely controlled by inhibitory substances in the gelatin. In the subsequent processes, the mechanical strength of the jelly phase, and the swelling capacity of the gel are important, and their measurement and regulation are noted. The importance of the isoelectric point and of the hydrogen ion concentration for the behavior of the amopholytic gelatin in the photographic process is discussed, particularly in relation to the acid-fixing and hardening bath. The behavior of gelatin jellies on drying is considered to be explicable without recourse to structure theories of the jelly. S. E. SHEPPARD, *J. Ind. Eng. Chem.*, 11-22, 5000 w. CJW.

Paint. General descriptive article. Historical. Three types are differentiated by their vehicles: Oil paint, enamels, cold water paint. Oldest and best known pigment is white lead. Lithopone also important. Other pigments. Linseed oil best known vehicle. Thinners. Colorded pigments. Varnishes. Contains no new material. C. M. COCHRUN, *Building Materials*, 10-22, 5000 w. CJW.

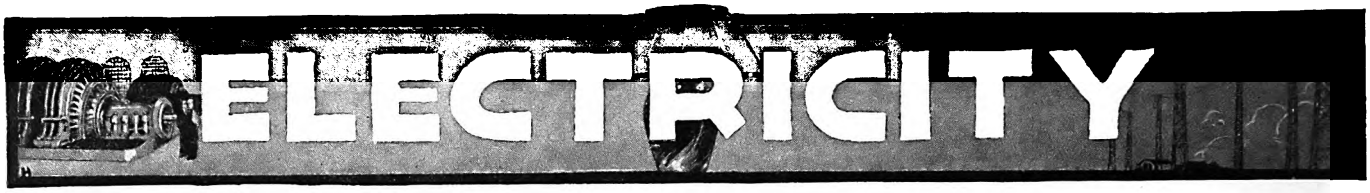
Electrical Precipitation. Brief description of the use of the Cottrell electrical precipitation process to the manufacture of sulfuric acid, hydrochloric acid and phosphorous pentoxide, and its application to the detarring of by-product gas and illuminating gas, dry, hot cleaning of iron furnace gases, wood distillation, recovery of soda salts, etc. P. E. LANDOLT, *J. Ind. Eng. Chem*, 11-22, 2000 w. CJW.

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Developing New Markets

MERCHANDISING men in the electrical field point out the need of developing the farm market for electrical devices. R. C. Cosgrove, of the Westinghouse Electric and Manufacturing Co., says in *Central Station* that only 300,000 of the 6,500,000 farms in the U. S. today use electricity.

"The people living on the other 6,200,000 farms are without electricity, and need it," Mr. Cosgrove says. "Not only will it lighten farm work, but it will make life more pleasant. The farmer can use electricity in numerous ways—to run motors, drive grinders, milking machines, water pumps, churns and separators. Electric lights are needed, too, because they provide the only safe method of lighting a barn or stable.

"Farming, like every other industry, is on a competitive basis. Only the more efficient will be successful so it behooves the people in the country districts to take advantage of every opportunity to increase production. Farmers need electricity even more than the people in the cities do. Their homes are seldom equipped with running water or gas. Especially will it help the wife because her duties are so laborious and of so great a variety.

"These people suffered heavily during the depression. Farm products actually sold below cost while everything else still remained high priced. This being the case, very little material was bought. However, during this depression, the farmer accumulated quite a desire for certain improvements. Electricity was one of these. He had seen it advertised so often while the farms that were already wired gave excellent proof of its desirability.

"Times are better now. The price of a bushel of wheat and the cost of farm utensils have reached a reasonable ratio, and he is beginning to buy. As a proof of this, one of the largest manufacturers of small lighting plans claims that twice the number of plants were sold this year as compared to last."

Model Electric Home. Description of Spokane's venture, in which 6-room house was fitted with 152 lighting, heating and convenience outlets were installed. During the exhibition, each was connected with some piece of electrical equipment. All appliances were selected by selection committee and loaned by Electrical Service League. During 15-day period about 20,000 people visited house. Total advertising cost, 5 cents per person. R. B. McElroy, *J. Elec. and West. Ind.*, 9-15-22, 750 w. CJW.

What a Dime Will Do. Operate a 16-c.p. lamp for about an hour. Operate a 6-lb. flat iron for 1½ months. Do a washing equivalent to 20 sheets each week for about 2½ months. Operate a vacuum cleaner long enough to clean about 1/10 of an acre of carpet. Operate a sewing machine for 20 consecutive hrs. Drive an electric fan 4 hrs. a day for nearly a week. Brew 2½ gal. of coffee in an electric percolator. Operate a heating pad for from ½ to 1 week, depending upon the heat used. Operate a foot warmer five consecutive hrs. Operate a water pump long enough to raise 100 gal. 1,100 ft. Make 100 slices of toast. *J. Elec. West. Ind.*, 9-15-22. CJW.

Automatic Hydro-electric Stations. Function supplying comparatively small amounts of power which may be delivered into main system at any convenient point or to correct the power factor. Equipment consists of waterwheel, direct connected to synchronous generator, waterwheel governor, mechanism for controlling water gates and automatic control equipment. Two general classes. Control of first independent of any other station being started or stopped as conditions require by some device such as float switch. Second depends upon impulse from controlling station. General description of typical station. One important feature is protective equipment supplied to prevent damage to machine in case something goes wrong. Degree of protection depends upon size of station. Troubles and their remedies are briefly outlined. F. R. Culp, *Power*, 10-3-22, 1500 w. CJW.

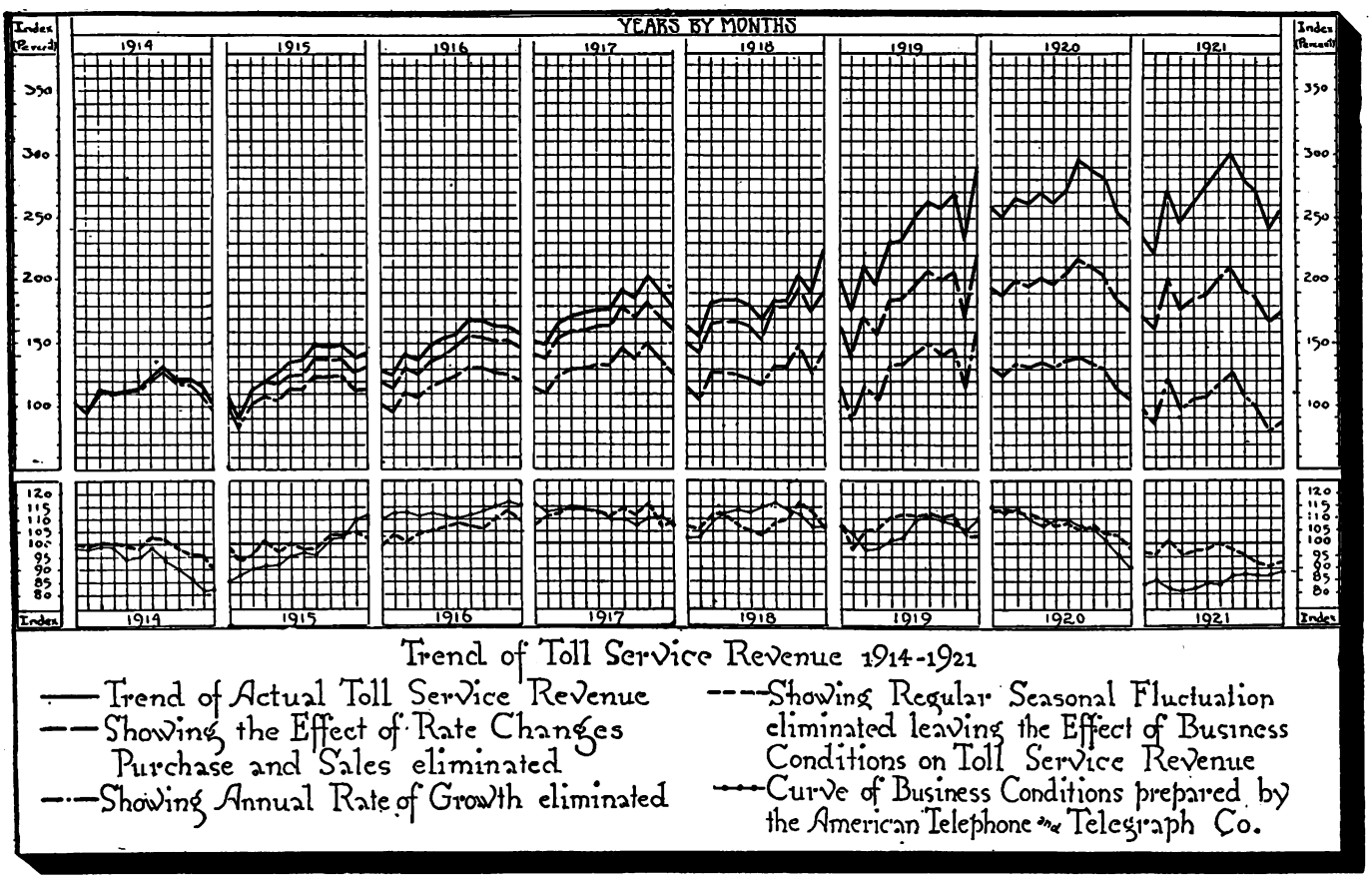
Transmission Systems. In making the electrical calculations for a long transmission line, it is desirable to include the effect of the step-up and step-down transformers, and to make a direct calculation for the complete system, without any trial and error procedure. A method for doing this is described for constant voltage lines, since long, high-power lines, specially those of 220,000 volts, usually require to be operated at constant voltage by means of synchronous condensers. The necessity of using the hyperbolic theory in calculating such lines is pointed out. H. B. Dwight, *J. Am. Inst. Elec. Eng.*, 10-22, 2500 w. CJW.

Overload Protection. With large majority of protective devices it is matter of prime importance that passage of a current greater than can be safely carried momentarily by the apparatus to be protected should open the circuit in the shortest possible time. This eliminates the time element device as applied to circuit breakers. Among available methods of obtaining delayed action are: Commercial fuse, oil dash pot, air dash pot, air bellows and the suction disc. Advantages and disadvantages of these are considered. H. M. Phillips, *Southern Engineer*, 10-22, 1800 w. CJW.

Radio Telephone. Wireless provides emergency means of connecting the remotely situated power stations and construction camps with operating headquarters when pole elements have been destroyed by elements. Radio telegraphy has never been made use of to any extent because of difficulty of learning code, and stringent operator's requirements. One competent engineer could supervise radio telephony system. R. C. Denny, *J. Elec. West. Ind.*, 10-1-22, 1200 w. CJW.

Million-Volt Testing Set. Item of greatest moment in this work is fact that for first time the extremely high potential of 1,500,000 volts was reached and an electric spark discharge was repeatedly caused to take place bteween sharp electrodes spaced 14 ft. apart. This will be valuable in magnifying the possible troubles which may arise in the 220,000 volt practical installation. Will have uses for various researches in insulation, ionization, spark discharge, lightning, high frequencies, designs of apparatus, and so on. Not upper limit. Notable features in design of the transformers. How to interpret the photographs of electric discharges. (To be continued.) A. B. Hendricks, Jr., *J. Am. Inst. Elec. Eng.*, 10-22, 5000 w. CJW.

Exciter Instability. The form of equation for exciter voltage and current is the same as the well-known equation for the electric circuit containing resistance, inductance and capacity. Hence the same form of oscillations and transients are involved, the only difference being that in the present case the duration of the transients is much longer. Instability may occur when the exciter is operating on the straight part of the saturation curve, if in addition some combination of the following conditions exists: very low residual voltage (1%), relatively large voltage drop in armature, large inductance in the load circuit, as always exists in the alternator field, alternator transient of greater duration than the exciter trancient, excessive series field strength. Instability may be classed under: Voltage "creeping" and "double energy" transients. Former may be caused by slight speed transients of the exciter or by temperature transients causing corresponding resistance transients in the shunt field circuit. The "double energy" transients, such as oscillations and reversal of excitation, may be initiated by a shock, such as a short circuit on the alternator, or sudden, relatively large change circuit in constants, for instance, a large change in resistance in the shunt



(Telephony)

The trend of telephone conditions since 1914 compared with the curve of business conditions as prepared by the American Telephone & Telegraph Co.

field circuit. The exciter can be stabilized against voltage "creeping" by special design, by few battery cells connected in series with the shunt field, by separately exciting the shunt field, by automatic voltage regulator, by rheostat in the alternator field. It can be stabilized against "double energy" transients by properly designed series field, automatic voltage regulator or both, and by alternator field rheostat. Equations and tests are given. R. E. DOHERTY, *J. Am. Inst. Elec. Eng.*, 10-22, 8000 w. CJW.

Extra High Tension Insulators. Insulators for extra high-tension work, before they are put into service, should be subjected individually in the case of suspension units and on each shell in the case of pin insulators, to flash over pressure for a definite period at both high and low frequency or at least to high frequency. A percentage of each shipment should be subjected to hydrostatic pressure test. Insulators can be made and are being made that will not be overstressed by such tests and which should remain good in service for an indefinite period. A proportion of insulators supplied hitherto have been porous, and should be replaced at once by those thoroughly tested. Extreme care should be exercised in the selection of the type and shape of insulator, having regard to the form of electrostatic field and to the self-cleansing form of the insulator. There is room for more cooperation between the insulator manufacturer and the purchasing agent in regard to acceptance tests and handling and maintaining of the insulator in service. C. C. FARR and H. E. R. PHILPOTT, *J. Am. Inst. Elec. Eng.*, 10-22, 6000 w. CJW.

Polyphase Wattmeter Connections. Importance of accurate wattmeter readings must not be underestimated, especially when it comes to the matter of figuring costs. Article discusses, with diagrams, operation of watthour meters and some of the various connections that are possible with different types of wattmeters and integrating watthour meters. Many of the errors of meters are due to improper connection rather than to any inherent error of the meter itself. Potential and current transformers, polarity, wattmeters. L. B. STAUBITZ, *Power Plant Engineering*, 10-15-22, 1500 w. CJW.

Polyphase Induction Motor. The starting efficiency of the automatic start polyphase induction motor is substantially the same as for shunt or compound-wound direct-current, the polyphase slip-ring motor with resistance in rotor starting, and the single-phase repulsion-start induction motor. This type of motor in all sizes may be started by closing the switch without the use of a starter of any kind as it takes static current of not over 300% of full-load current, and has static torque of about 250% of full-load torque. This type of motor is simpler to install and operate than the direct-current motor with starter or the polyphase squirrel-cage motor with compensator or the polyphase wound-roto-slip-ring type of motor with resistance at starting. A commercial and practical method has been outlined for analyzing existing motors or predetermining the performance of new motors. The excellent performance and the comparative freedom from trouble and annoyance of the automatic short-circuiting devices has established this motor in the polyphase motor field. J. L. HAMILTON, *J. Am. Inst. Elec. Eng.*, 10-22, 6000 w. CJW.

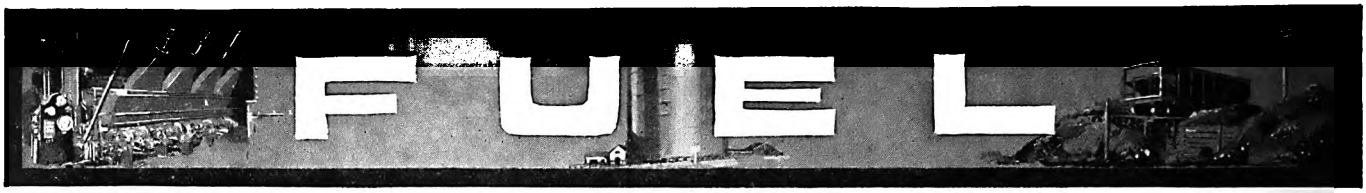
Grinding Commutators. Success of grinding wheel depends principally on using proper cutting speed. Best speed from 5000 to 6000 ft. per min. Should avoid low cutting speed, because wheels will not cut freely and will wear away rapidly. Speeds for different diameters of wheels given. Wheels usually run out of true when first tried. Method of lining grinding device. Use a light free cut and take off the high spots first. Leave low spots until rest of commutator is reduced to desired extent. Finer grade wheel is often used for finishing. Commutators 1-2 ft. in diameter would take from 1-4 hrs., one 6 ft. in diameter 1-4 days. Machine best wiped with brushes or rags and all copper dust removed before blowing with air. Assembling. Sandpaper should never be used except for lightest kind of polish. E. H. THOMPSON, *Power*, 10-3-22, 1800 w. CJW.

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New Coal Fields

THE future extensive development of a substantial coal-mining industry in the public land areas of certain Western States is forecast in statistics compiled by the Federal Bureau of Mines which show that up to October 1, the bureau had issued 263 permits for prospecting for coal on Government lands, 42 leases for commercial coal operations on these lands, and 5 licenses for production of coal limited to personal use.

The total minimum annual production of coal required in the issuance of these various authorizations is 1,586,550 tons, which is approximately equivalent to the total annual coal production of Michigan, and which approaches the yearly coal production of Arkansas or Texas. The total investment to be expended on leases amounts to $2,453,550.

The effect of these new developments upon the general coal situation is one of the matters which the newly appointed Federal coal commission will have to consider. In the meanwhile the existing fields are making efforts at extraordinarily rapid production. The railroads are hauling more coal than at any other time in their history. With the continuance of mild weather, the general feeling is that the coal situation is no longer serious. Attention is now focused upon the possibilities of another strike next year, and upon the expected activities of the coal commission.

The Bureau of Mines' authorizations are grouped by states as follows:

	Permits	Leases	Licenses
California	2	..	..
Colorado	51	6	2
Idaho	4	..	..
Montana	36	2	1
Nevada	14	..	..
New Mexico	13	2	..
North Dakota	4	5	..
Oregon	19	..	..
South Dakota	3	1	1
Utah	27	15	..
Washington	14	2	..
Wyoming	76	9	1

Tests for Coke. The shatter test affords a measure of the relative resistance of cokes to breakage in handling. Single determination by this procedure contain an average error of 1% to 3%, depending upon the character of the coke tested. It is recommended that several screens be used as indicators of the shattering effect, i.e., 2 in., 1.5 in., 1 in., and 0.5 in. Results of the bag shatter test are in fair agreement with those of the machine shatter test when the bag is dropped 4 times. The effect of the size of the pieces of coke in the sample used upon the absolute and relative value of the results obtained should be further studied. The tumbler barrel test as at present carried out has no meaning when the test is applied to cokes of varied physical properties. It may have value as applied to the daily testing of coke supplied to a blast furnace whose coke supply is not subject to large variations in resistance to shattering. If a screen analysis from 2 in. to 0.25 in. be made after the tumbler test, an indication of the quality of the coke is obtained, but such data indicate no property of the coke which would not be shown by the ordinary shatter test. If the tumbler test be carried out with 0.75 to 0.25 in. coke, the percentage remaining on a 0.25 or 0.17 in. screen after the test is probably indicative of the resistance to abrasion. This value, however, is little different for a variety of cokes and its meaning in terms of blast furnace or other operation is by no means clear. S. P. KINNEY and G. ST. J. PERROTT, *J. Ind. Eng. Chem.*, 10-22, 4000 w. CJW.

Combustion for the Boiler Room Operator. The boiler and the furnace, their functions are discussed. Different kinds of fuel, their composition and analysis are described. Heat value is derived from Dulong's formula. T. H. FENNER, *Power House*, 8-20-22. IG.

Residual Department. Gas managers of today have been prone to consider residual department as side issue and are willing to accept any price offered by buyers. Use of coke and breeze should be demonstrated by gas company through its efficient use in its own plant. Tar frequently sold for less than its fuel value. Coal tar production should be 12 gallons per ton, and water gas plant should produce 15% of gas oil used. Coal gas plant should produce 4-5 lbs. total ammonia per ton of coal. In order to pay for coal carbonized, at 7 per ton, coke should sell for $6.16 (1350 lbs.), tar $0.48 (12 gal.) and ammonia at $0.36. Recommended that residual department be placed in hands of commercial department. G. H. WARING, *Am. Gas. J.*, 9-23-22, 1000 w. CJW.

Gum Forming Constituents in Gasoline. Study of the various methods of evaporation and oxidation of cracked gasolines lead to the conclusion that gummy and resinous deposits are caused by oxidation and have no direct relation to unsaturation as determined by solubility in sulfuric acid. A new and convenient method has been developed for determining these gums. They are probably polmerized aldehydes, which are formed from the oxidation of olefins, etc. Storage tests included in the paper confirm these conclusions. N. A. C. SMITH and M. B. COOKE, Bureau of Mines, Reports of Investigations, No. 2394, 9-22, 12 pp. CJW.

What is believed to be the thickest seam of black coal discovered in the world is being exploited in Queensland, Australia. The seam is entirely free from clay bands and is 93 feet thick in places. The mine is 280 miles from the nearest seaport.—*Dearborn Independent.*

Bark and Wood Refuse as Fuel. Refuse to be of much value as fuel must be at least 50 % dry or design of furnace must be such that it is dried to this extent before reaching the combustion zone. The construction of the furnace, the control of air and the method of feeding the fuel must be carefully considered. The best method of measuring the waste will vary in different mills. Available data shows efficiencies on refuse varying from 36% to 71%, which indicates the possibility of important savings in a study of this subject. *Paper Trade J.*, 10-5-22, 2500 w. CJW.

Corn as Fuel. For fully cured corn (10% moisture) the effective heat value is approximately 5700 BTU per lb. Corresponding value for Pittsburg, Kan., coal is 11,800 BTU per lb. Heat value of 50 bushels of corn on cob or 63 bushels of shelled corn is about equivalent to one ton of bituminous coal. With coal at $10 per ton, corn on cob must be less than 20 cents a bushel of 70 lbs. and of shelled corn less than 16 cents per bushel of 56 lbs. to make it more economical to burn than purchased coal. W. L. DEBAUFRE, *Power*, 8-8-22; *J. Am. Soc. Heat.-Vent. Engineers*, 10-22, 1000 w. CJW.

Meters. Report of committee on determination of meter capacities. Use of air at pressure not exceeding 10 in. (better between 1-2 in.) at 60°F. Procedure outlined. H. S. BEAN, G. A. LANE, *Am. Gas. Assoc. Mo.*, 10-22, 2500 w. CJW.

Three million tons of potential fuel in the form of soot, escapes into the atmosphere of London annually. This represents a direct waste of approximately $25,000,000, according to official reports.—*Dearborn Independent.*

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"No Copper Soon"

BRASS WORLD is mildly annoyed by a statement attributed to Sir Edward M. Edgar, a British banker and industrialist, to the effect that soon there will not be enough copper to supply the world demand. By "soon," the magazine says, Sid Edward means within 20 to 50 years.

"It would seem as if the noble knight had had himself interviewed," remarks *Brass World* editorially, "and that he particularly wished to stress the agreement that had been made between the Russian Soviet and Leslie Urquhart, called the Russo-Asiatic Consolidated Co. Sir Edward thinks the world is running short of copper, lead and zinc, but the present sources of the largest supplies (United States) will be supplemented by these vast Russian stores of the metals and be ready to mend the situation.

"What we mine, Sir Edward says, will be less, much less than enough for our own needs in a matter of about 20 years, or, at any rate, 50 years. Our extravagant and luxurious living methods will make the metals under comment inadequate, and so following for a long interview.

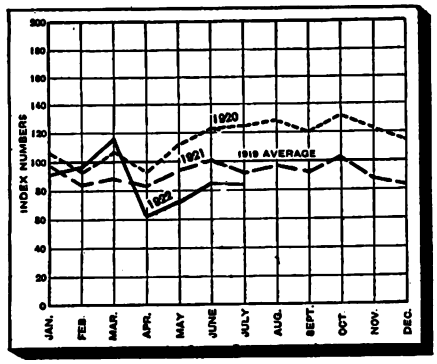
"The crux of the thought would seem to lie somewhere in the depths of the quotation following. Perhaps the reader can discover it for himself:

"'That is where the Russo-Asiatic Co. and the agreement with the Soviet authorities comes in. If it is allowed to develop to the full extent of its capacity, it might easily be the greatest producer and purveyor of copper, lead and zinc to the world. It will free British industry from its servitude to these essential trans-Atlantic raw materials and it will secure for us a sufficient supply that will be felt in every department of British commerce and manufacture, and it will result in the coming period of leanness and scarcity being followed by long years of plenty that will more than reestablish us in our old prosperity.'"

Tin. Analysis of statistical position of tin from the angle of both visible and invisible supplies; an account of the former and consensus of opinion, as near as possible, of the amount of the latter: where and how held, prospect of early release and probable effect of such release upon the market. Economics of so-called tin hoarding as practiced in the East and of governmental interference in industry. R. H. TINGLEY, *Raw Materials*, 10-22, 2000 w. CJW.

Enrichment of Silver Deposits. Ore enriched by precipitation or substitution of certain metals are porous and open textured, and usually show characteristic changes downward. Porous leached outcrop stained with iron suggests secondary ore below. Few silver mines discovered of which outcrops have not shown some silver content. Silver is transported mostly in form of sulfate and thus source of sulfuric acid is of importance. This is the iron minerals. Silver shows little solution or transportation in deposits that carry non-appreciable iron sulfides. Seldom happens that all silver dissolved in upper part of deposit is fixed as halide. Secondary silver sulfides are numerous and in some veins abundant. Action of various salts on silver. Conditions governing enrichment. RUSH T. SILL, *Mining & Metallurgy*, 9-22, 2000 w. CJW.

Nickel and Alloys. Properties of nickel which make it of commercial value are: Mechanical toughness, resistance to corrosion, heat resistance and decolorizing power. Illustrated in 4 types of alloys, nickel steel, monel metal, nickel-chromium alloy and german silver. Source and production of nickel. Malleable nickel. Physical properties. Uses of various alloys. Second article discusses properties and uses of nickel-silver and monel metal. Commercial forms of monel metal are: Hot-rolled rods, cold-drawn rods, hot-rolled bright annealed sheet, cold-drawn wire, cold-drawn strip, welded tubes and castings. How monel metal should be melted, cast and forged. Monel metal is readily machined, threaded, tapped and drilled; cutting tools should be made from first-class grade of high-speed steel. Cast metal has particularly tough outer skin and requires stronger tools. Methods of tapping. Selection of proper lubricant very important when machining the metal. Precautions to be observed in welding, using oxy-acetylene torch, spot or resistance welding process or metallic arc welding process. Soldering, brazing and annealing monel metal. Tools and dies for spinning and drawing. P. D. MERCIA, *Am. Machinist*, 9-14-21, 28-22, 7000 w. CJW.



(Bureau of Census)

Index of mineral production (1919 averages = 100).

Water in Blister Copper Bars. Blister copper bars will lose about 0.2%-0.3% of moisture when dried in furnace. Varies from 0.02% to 0.8%, which means 0.4 to 16 lb. per ton of metal. In making moisture determinations, care should be taken if car is used, to check loss of weight of car on heating. Method of making determination. A. R. LEDOUX, *Mining & Metallurgy*, 10-22, 1000 w. CJW.

Corrosion. Three classes: atmospheric, underwater and soil. Main factors which control rate and distribution of corrosion of iron in water are: Amount of oxygen in solution, temperature, quantity and velocity of flow, quality of water and contact with electro-negative material. Protective coatings are divided into non-metallic, such as paints and bituminous dips and metallic coatings. Under certain conditions iron and steel may acquire protecting film. Problem of protecting metal pipes and tanks carrying water is one of removing free oxygen before it enters system and preventing further supply of oxygen. May be removed by chemical, mechanical or physical means. Discussion of American and European practices. To be continued. F. N. SPELLER, *Blast Furnace*, 10-22, 3000 w. CJW.

Dip Brazing. Equipment and material necessary. Uses long grain lump spelter. Heated to molten state, and flux added on to molten spelter to make approximately 1 to 1.5 in. of melted flux and to cover surface of spelter in crucible. Spelter tested by means of test piece. Judges temperature of bath by freedom with which spelter flows on test pieces and also by color of spelter upon cooling. Should flow freely and be light yellow when cold. If too hot, will have dark brownish yellow color on cooling. Then necessary to add more zinc. Piece to be brazed should be hung on low carbon-steel wire hooks, should be dipped into pot by means of ordinary pair of tongs and should be completely submerged in molten spelter. Time must be learned by experience. All fittings should be slightly pre-heated before dipping. C. A. VANDUSEN, *Am. Machinist*, 9-14-22, 1600 w. CJW.

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World Steel Output Less than Pre-War Record

THE world is not using as much steel as it used before the war. According to data prepared by the National Federation of Iron and Steel Manufacturers of Great Britain, the total output of pig iron and steel this year for five leading steel producing countries will be 50,394,000 tons compared with 63,351,000 in 1913. The figure for this year is based upon the average production for the first six months.

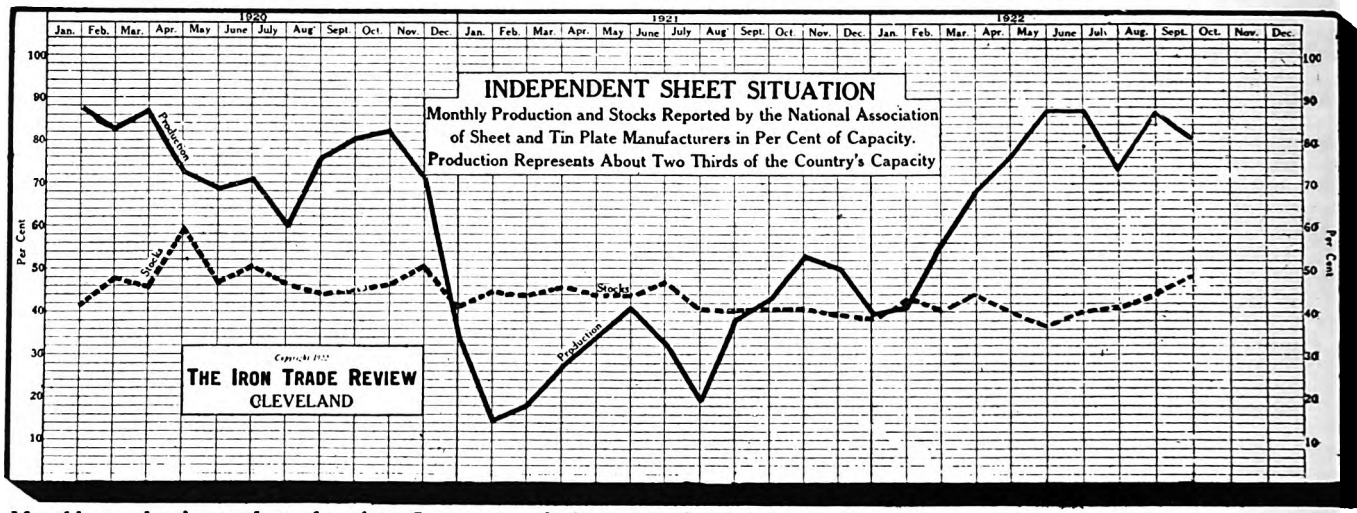
Output of Pig Iron and Steel in Five Countries, Gross Tons, Per Month

Pig Iron	1922	1921	1920	1913
United States	2,007,200	1,390,800	3,077,600	2,581,000
Great Britain	358,200	217,600	669,500	855,000
France	371,100	280,300	281,700	427,000
Belgium	106,900	71,800	92,700	203,800
Germany	510,000	508,000	464,000	1,373,000
Total per month	3,353,400	2,468,500	4,585,500	5,439,800
Year's output, tons	40,240,800	29,622,000	55,026,000	65,277,600
Steel				
United States	2,614,100	1,645,300	3,511,000	2,608,000
Great Britain	427,000	302,100	755,600	639,000
France	335,400	254,500	250,200	385,000
Belgium	98,000	65,000	101,300	202,300
Germany	725,000	725,000	552,000	1,445,000
Total per month	4,199,500	2,991,900	5,170,100	5,279,300
Year's output, tons	50,394,000	35,902,800	62,041,200	63,351,600

"Viewed as a whole two facts stand out: neither in pig iron nor steel will the world's output this year approach that of 1913, nor even that of 1920," says *Iron Age*. "The other striking feature is that Germany still ranks second and did in 1921 as well as in 1913. Of significance also is the relatively small amount of pig iron both this year and last, as compared with pre-war output. The pig iron industry has by no means recovered to the same extent as steel.

"Of unusual interest is the contrast this year between the American steel industry and that of the other countries. In none of the latter has there been any approach to pre-war output, unless Germany be excepted, taking account of her present reduced capacity. There is also the fact that American steel production this year has exceeded that of 1913, which is true of no other country, while pig iron output thus far is at a rate more than 500,000 tons per month less than in 1913. The slow recovery in the British steel industry is also noteworthy."

The chart below shows the monthly production and stocks of sheet and tin plate since January, 1920.



Monthly production and stocks, since Jan., 1920, of sheet and tin plate in the U. S., expressed in terms of per cent of capacity.

Tensile Tests of Cast Iron at Various Temperatures. Results of work done on annealed bars in a special apparatus. Comparison with steel under similar conditions. Results given in graph and table. J. P. HARPER and R. S. MACPHERRAN, *Iron Age*, 9-28-22, 300 w. APS.

Mechanical Working of Iron and Steel. Mechanical working reduces forms in size to other forms and improves the quality by closing up cavities and refining the crystal structure. Pressure during mechanical working is applied by hammering, pressing and rolling. Hammering and pressing constitute forging. Details of rolling mill practice starting from the ingot. The rail mill; continuous mills. The wire rod mill with diagrams illustrating the various passes. The merchant mill with diagram of the various passes. The sheet bar mill. Rolling of deformed or irregularly shaped sections. Re-rolling of rails. Used rails are heated and rolled to smaller sections (pit rails) or split into head, web and flange parts, which are rolled into angles, steel ties, fence posts, etc. I. WALTER BUCKLEY, *Jour. Eng. Inst. Canada*, 10-22, 10 figs. 5000 w. APS.

Metallic Iron in Sponge Iron. Methods commonly employed for determining the copper-precipitating value are satisfactory for that purpose if they are performed under conditions that hold in plant operation, but, in most cases, they are not satisfactory for determining the metallic iron content. When a copper sulfate solution is treated with metallic iron, more than an equivalent weight of copper is precipitated if the solution is either neutral or contains less than 0.075% sulfuric acid, whereas less than an equivalent weight of copper is precipitated if the solution contains more than 0.075% sulfuric acid. In the method described, precipitation of the copper from a neutral solution is preferred but the acidity of the solution is not important unless it be sufficiently great to cause solution of any oxide of iron that might be present. Sulfur, present as ferrous sulfide, causes high results in this and in other methods described. C. E. WILLIAMS and A. E. ANDERSON, *J. Ind. Eng. Chem.*, 11-22, 2500 w. CJW.

Alloy Castings from Electric Furnaces. Nickel, chromium and chrome-nickel steel. Their production, properties and heat treatment. Manganese steel parts cannot be machined, nor is the scrap valuable, so that alloy castings are made to overcome these difficulties. The melting practice, molding and heat treating. LARRY J. BARTON, *Iron Age*, 9-28-22, 2500 w. APS.

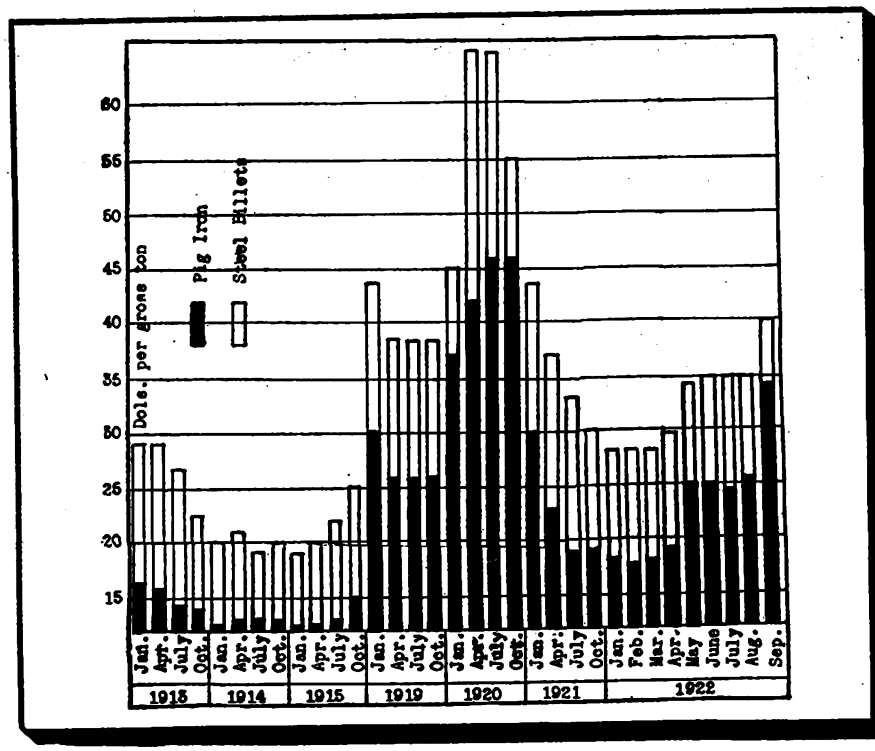
A new copper process makes it possible to weld together iron and steel parts. The copper penetrates into the fine pores of the iron and forms a firm weld. —*Dearborn Independent.*

Vacuum-Fused Alloys. Preparation and mechanical properties of an extensive series of very pure alloys of electrolytic iron, carbon and manganese, whose composition were so chosen as to bring out specific effects on pure iron of additions of manganese, carbon and mixture of these two in varying relative proportions. The maximum content of each carbon and manganese in each series is about 1.5%; the minimum, 0%, or pure iron. Three-pound ingots of the alloys were made by melting electrolytic iron under vacuum in an electric furnace in a crucible of pure magnesia, to which the carbon and manganese were added after fusion of the iron. In amounts below 1% the ultimate strength of the alloys were increased by carbon as was the hardness. The proportional limits of the alloys were influenced by carbon less than the other properties. Manganese increased the ultimate strength of the alloys only slightly, which is also true of the proportional limits. Brinell hardness numbers were increased about 0.5 by each 0.01% of manganese when carbon was present, but had very little effect on the ductility of the alloys. The effects of manganese and carbon on the mechanical properties of the alloys were each influenced by the other. R. P. NEVILLE and J. R. CAIN, *Trans. Am. Electrochem. Soc.*, 9-22, 16 pp. CJW.

Specifications for Steel Castings. General discussion covering the important features of steel castings specifications, such as chemical composition, physical properties, ductility and testing. Specifications are not ordinarily employed for unannealed castings. Elastic limit specification is not readily applicable to steel castings and in some proposed revisions minimum yield point is specified when tensile strength specification is omitted. Tensile strength is more satisfactory to use for steel castings because it can be more exactly determined and because it shows a more uniform relation to the other properties. Of late more attention has been given to strength of materials under repeated and reversed stresses and to methods of determining this property of resistance to fatigue. Use of Brinell hardness test is steadily increasing in metallurgical testing because of its ease of execution and dependability and the significance of its results. E. R. YOUNG, *Blast Furnace*, 9-22, 2500 w. CJW.

Zinc Coating on Sheets. A new method of determining thickness of zinc coating which consists essentially in immersing a test piece in concentrated hydrochloric acid and measuring the maximum rise in temperature. From the volume of acid used, the size of test piece, and the rise in temperature the weight of zinc in ounces per square foot can be obtained by a suitable conversion factor. D. M. STRICKLAND, *Iron Age*, 9-21-22, 1200 w. APS.

Sheet Steel Crucibles and Truck Type Switching Equipment in Steel Mills. Sheet steel cubicle is the ordinary panel mounted type of switchboard equipment enclosed in a rectangular sheet steel box.



(Brick & Clay Record)

Wholesale price trend of valley furnace basic pig iron and open hearth steel billets, Pittsburgh, 1913-Sept., 1922.

Any number of cubicles may be assembled to form a continuous board. Two types of cubicles are described, the interlocked and the non-interlocked. Truck type switchboard differs materially from the steel cubicle in design and construction. Field of application practically the same. Each is limited in capacity and voltage rating. Great application for sheet steel cubicle, truck-type switchboard and truck-mounted all circuit breaker in the steel industry. Extensive use would reduce labor cost due to safety first feature, permitting the employment of unskilled operators. Operating conditions would be improved in any plant by their use. Serious need for this equipment in steel mills. G. P. WILSON, *Electric J.*, 9-22. IG.

Enameled Containers. General description of manufacture of enameled ware, with special emphasis on use of compressed air in industry. Surface to be enameled must be smooth, accomplished by sand blasting. Air is supplied by compressor, which air is also used for helmets of the operators. In case of defects, the entire coat is removed by sand blasting. Compressed air is also used for operating doors of furnaces. ROBERT G. SKERRETT, *Compressed Air Magazine*, 8-22, 1800 w. CJW.

Wire Rope. Beginning of the industry. Materials used are iron, crucible cast steel, extra strong crucible cast steel, plow steel and improved plow steel. Surface scale removed before rods are drawn into wire; done by acid after which rods are dipped in lime. Then wheeled into oven and baked from 3 to 12 hrs. at 250-400° F. to dry coating and prevent brittleness in wire. After this, drawn into wire. Must be annealed before drawn to smaller sizes; this corrects distorted and elongated conditions of crystals caused by cold working. Ropemaking consists in three distinct processes: Winding wire on bobbins, twisting wire into strands and closing strands around hemp or steel core. Core is an important adjunct. Partial list of wire rope applications given. J. D. KNOX, *Iron Trade Rev.*, 9-11-22, 3000 w. CJW.

Better Results from Wire Rope. Too many accidental breaks occur from too little thorough knowledge of wire ropes, their strengths, and proper methods of fastening. There are six kinds of commercial wire rope, from iron having tensile strength of 60,000 lb. per sq. in. to improved plow steel with 220,000 to 280,000 lbs. per sq. in. Gives directions for telling various grades, and illustrated descriptions of various wedges and fastenings and methods of applying and using. E. O. KEATOR, *Rock Products*, 10-7-22, 3000 w. CS.

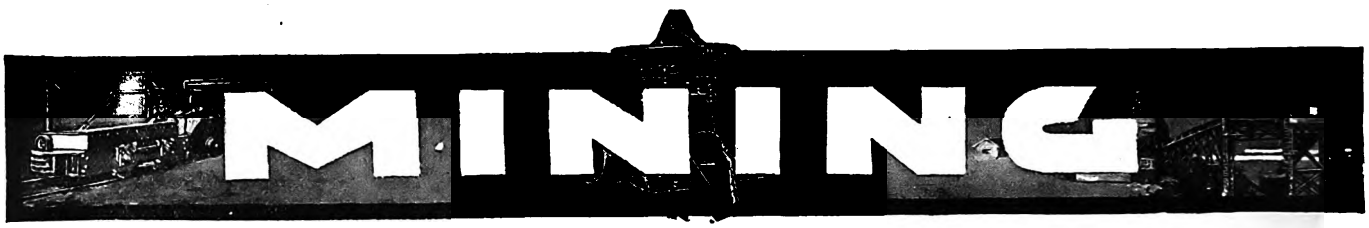
Welded Rail Joints. Principal types of joints include cast, resistance, seam and thermit welds. For all types of rail joints our knowledge of the physical, chemical and metallurgical problems involved is altogether inadequate. From the engineering point of view, we do not know either the loads applied to the structure or its powers of resistance. We do not know how to make joints that will last as long as the rail. Scientific study must be undertaken with expert direction and adequate resources. E. M. T. RYDER, *J. Am. Welding Soc.*, 9-22, 2500 w. CJW.

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The Need of Wildcatting

METAL-MINING REGIONS, as well as oil districts, must be explored by wildcat methods if the American mining industry is to continue to advance, in the opinion of Walter H. Trask, in a paper presented at the Silver Anniversary Convention of the American Mining Congress in Cleveland.

Outlining the dependence which the mining industry must place in the future upon intensive geologic research after the more obvious deposits have been exhausted, Mr. Trask's paper incorporated the geological theory that major faults were capped after their formation and that no efforts to develop them for their mineral contents should be made unless great expenditures and explorations to deep depths were prepared for.

The more logical method of exploration, it is generally stated, is to search for minor faults and fissures surrounding the major fault. It is in these minor faults that the mineralized solutions and gases found relief in their desire to escape, and they only begin to deposit their burden in quantity when relief from these conditions is obtained.

It is in intensive exploration of areas surrounding major faults that "wildcatting" will come to the fore as a means of adding materially to the production of the mining industry, according to Mr. Trask's theory.

"The psychological time is at hand for intelligent prospecting," concluded Mr. Trask's presentation of the theory, as reported in the *Arizona Mining Journal.* "In general, find a major fault. Locate and prospect the minor faults, and work will be carried on in essentially favorable localities. When a mineralized minor fault is found, other minor faults, roughly parallel to its general direction, as well as cross faults, are to be expected, and are likely to be highly productive. Often some of these secondary ones do not reach the surface and must be searched for in crosscuts or by the diamond drill. All these factors should be remembered and capitalized in considering conditions in old mining centers where it perhaps is thought that all possible paying ore channels have already been discovered and explored."

Placering in Tropical Countries. Enterprises often fail because in tropics problem of water is one of controlling water which at seasons and on occasions comes in superabundance. Much damage is done by cloudbursts. Sluicing on tropical streams is impossible at most seasons and very uncertain at all seasons. Dragline dredging method promises a solution. Advantages are: low cost of installation, first cost of actual machinery and equipment, security of installation, saving of sluice values, indifference to shifting of gravel bars and refilling of stripped areas by flood, flexibility. A. D. AKIN, *Eng. Mining J.-Press,* 9-16-22, 1600 w. CJW.

Market Values of Ores from Mexico. Net return to miner on shipments to smelter is only small proportion of market value of contained metal. Examples of calculations are given. Thus, for copper ore, the miner receives $1.72 per ton for ore the total copper content of which, in a refined condition, would be worth $12.90. In the case of lead the percentage of total lead value received by the shipper is 25.6%; silver, 44%; zinc, 18.8%. S. F. SHAW, *Eng. Mining J.-Press,* 9-23-22, 1500 w. CJW.

Improvement of the Kansas State Mine. The system of mining used at Kansas State Mine is the Scotch long wall method, or finger entry method, which is applied in cases where roof will not permit face track to be used. The thickness of the coal seam at this mine is 22 ins. Desire to get out as much coal as possible led to neglect of mine, and face roads in many cases were 600 ft. long, as cross entries were not turned out at proper intervals. A survey having been made, systematic plan of improvement was inaugurated. This included the electrification of the mine, change in the arrangement of the shaft bottom, and alteration of ventilation system. Detailed account of the electrification is given. *Coal Industry,* 8-22, 3500 w. CJW.

Mine Fires. More common causes of fires are: ignition of timber, wooden stoppings and brayyice cloths; of hay or oil-soaked material by open torches; of coal by blown-out shots or explosion of fire damp or coal dust, or improper use of explosives; short circuits of electric currents due to falls of ground, loosened trolley wires, or poor insulation; surface fires communicated to mines through shafts, slopes or tunnels; fires originating in underground shops; ignition by friction of oily, wooden rollers on rope haulageways; spontaneous combustion of timbers, coals, greasy waste, etc. Discussion of methods of prevention of these various fires and of fire-fighting equipment and apparatus. Methods of fighting fires. R. H. SEIP, *Coal Industry,* 9-22, 3000 w. CJW.

Ignition of Gas by Electrical Detonators. Tests have been made to determine conditions which cause gas ignitions from heated leg wires of electric detonators. Following preventive measures are suggested: Connect the detonators in parallel-series, series-parallel or straight series. Limit the time length of connection to the firing supply to from 0.2 to 0.15 seconds. Use electric detonators with copper leg wires. Use a firing current supply having the lowest standard voltage that will satisfactorily fire all of the detonators as connected. For example, do not fire from a 600-volt circuit if 220 volts would be ample to give at least 2 amperes through every detonator. Use an ungrounded firing circuit. L. C. ILSLEY and A. B. HOOKER, Bureau of Mines, Reports of Investigations, No. 2383, 8-22, 1000 w. and tables. CJW.

A new way of checking fire in mines is by means of fine rock dust placed in boxes and suspended across the roof of the tunnel. Explosion shocks cause the boxes to break away from their support and the finely divided dust falls into the passage preventing the flames from spreading.—*Dearborn Independent.*

Pumping in Anthracite Coal Mines. An enormous amount of water must be handled in anthracite coal mining, due to great extent of workings, large watersheds tributary to mining area, and cracks and fissures opening to surface. Figures show that an average of 13 to 20 tons of water are handled for every ton of coal produced, and in some cases as high as 80 to 100 tons of water per ton of coal. This problem requires special equipment, and problem of pumping is of great importance. Author traces development of the pumps from earlier types to present day models. Sumps, acid mine water and column lines are also discussed. C. H. MATTHEWS, *Coal Industry,* 8-22, 2000 w. CJW.

Loading in Low Coal. In Europe troughs of galvanized iron are used to bring coal from working faces to the gangway, these being either hung from timbers in the bord or supported on rollers. These troughs, which have an ultimate length of from 200 to 300 ft., are pushed to and fro 60-90 times per minute by an electric motor or one driven by compressed air. The impulses cause the coal to slide down the trough. Description of the apparatus and methods of working in mines. Work can be expedited to greater extent than by another method. Quickly installed at little cost and deteriorate slowly. May be used where ground is irregular and in surface workings as well as underground. A. GERKE, *Coal Age,* 9-28-22, 1000 w. CJW.

Underground Hygiene. Sanitation is common-sense application of the principles of cleanliness. Article considers drinking water, sewage disposal and ventilation. Water may be purified by distillation, boiling or chlorination. Piping is safest method of distribution. Importance of good ventilation and effect of poisonous dusts and mine gases are considered. R. R. SAYERS, Bureau of Mines, Reports of Investigations No. 2391, 8-22, 11 pp. CJW.

Permissible Apparatus. Lists of permissible equipment and supplies have been established for breathing apparatus, coal-cutting machines, electric cap lamps, flame safety lamps, shot-firing units, storage battery locomotives and explosives. Various schedules, stating procedure and requirements under which these devices and supplies are tested and fees charged, may be obtained by application to Director, Bureau of Mines, Washington, D. C. This list will be published once a year. Bureau of Mines, Technical Paper No. 307, 21 pp. (1922). 5 cents. CJW.

Shot Firing by Electricity. Lengthy discussion of the subject, treating of apparatus for shot firing (electric blasting caps, squibbs, blasting machine, leading and connecting wires), apparatus for testing blasting circuits, connections for electrical firing (series, parallel, series-parallel, parallel-series, firing from power circuits, and inside and outside firing systems. N. S. GREENSFELDER, *Coal Industry,* 9-22, 5000w. CJW.

Failure of Center Shots in Blasting. Gives results of laboratory and field tests by Bureau of Mines. Results show that if large number of common electric detonators are connected in series and fired under wet earth conditions, large leakage of firing current occurs, and detonators at each end of series circuit may fire while middle ones misfire. Recommends following practice whenever shots are to be fired in wet holes: (1) use waterproofed electric detonators with enameled leg wires; (2) fire shots from underground power circuit having capacity of at least 30-kw.; (3) use extra care when tamping holes in order not to damage insulation of leg wires; (4) arrange connections between detonators so they are supported clear of earth or other conducting medium. L. C. ILSLEY and A. B. HOOKER, *Cement, Mill & Quarry,* 10-5-22, 1800 w. CS.

Sand Test for Detonators. In the Snelling sand test sufficient sand should be used to yield practical maximum of crushing. It should be rounded and of a diameter practically uniform and sufficiently small to approximate the optimum fineness for the detonator used. Recovered sand should not be used for a second test. Confinement of the sand should be effected by a heavy weight of special design and the whole should be tamped down to a maximum compression. The detonator should be inserted symmetrically in the ball-like mass of sand. Different weights of the same detonator, or indeed equal volumes of the same differing in density, cannot exert crushing effects on sand directly proportional to the weights used. Comparisons of the strengths of different detonators as determined by the sand test are only approximate. W. B. DEHN, *Chem. Met. Eng.,* 10-18-22, 2000 w. CJW.

Tailings recovered from lead and zinc mines are being used in Wisconsin for fertilizer. Four to five tons to the acre benefit clover and alfalfa crops.—*Dearborn Independent.*

Mining dumps of South Africa are being worked by improved machinery to recover metals discarded when the gold was being recovered.—*Dearborn Independent.*

Testing Safety Lamps. Suggested tests are given for the shield, the lamp font, the hook or handle, upper gauzes, ignition bar, upper gauze joint, air admission gauze joint, wick adjusting bar, lock test, test for globe tightness. Bureau of Mines tests are also recorded. R. Z. VIRGIN, *Coal Trade Bull.,* 9-16-22, 2000 w. CJW.

Mica. Very valuable summary of existing information, including varieties, composition, physical and chemical properties, occurrence, imperfections, production and consumption, prices and markets, uses, substitutes, classification, specifications, mining, trimming and cutting, manufacture, and distribution of deposits. Sheet mica used in electrical industries in condensers and other apparatus as insulators and also as heat-resisting material in stove fronts, furnace sight holes, lamp chimneys and other heat-screens. Used as eye-pieces in many apparatus and as sound-producing devices in phonographs, etc. Splittings used in building up mica. Scrap mica is ground and used as coating on tar roofing, in paints, ornamental tiles and concrete. Also in car axle packings, in pipe and boiler coverings, fireproof paint, in rubber tires, annealing steel, absorbent for nitroglycerin, calico printing, etc. May be used as flux for ceramic wares. OLIVE BOWLES, *Reports of Investigations,* No. 2357, Bureau of Mines, 46 pp. CJW.

Many specifications for sheet mica call for India mica. This is due partly to the high quality of India mica which establishes it as a standard, and partly to prejudice against domestic mica due to improper grading and trimming. A rigid specification which rules out all but India mica certainly discourages development of the domestic industry, and domestic producers should endeavor to have specifications modified to read "India mica or its equivalent." This would give the domestic producer a fair opportunity to market a product of equal quality with the imported mica, and would encourage better grading and standardization of domestic mica. *Serial 2358.—U. S. Bureau of Mines.*

Ferric Salts in Leaching Copper Ores. Previous failure of use of ferric salts due to mechanical difficulties in handling pulp and solutions and presence of sulfide or insoluble copper in ore. Chemistry of reaction discussed. Calcine from sulfatizing roast, after being agitated in two Dorr agitators with ferric sulfate solution regenerated from spent precipitation liquors, passes to Dorr classifier whenever separation of sand and slime is made. Sand is treated in 3-deck washing classifier and slime is washed in series of counter-current decantation Dorr thickeners. Pregnant solution is treated with scrap iron for recovery of copper. In ferric chloride leaching, calcine, after being treated in Dorr agitator, passes to Dorr hydro-separator, making separation of colloids, which are thickened in Dorr thickener and washed in filter press. Underflow from hydro-separator goes to classifier, making separation of sand and slime, which is treated as above. Copper recovered with iron and spent solution treated with chlorine to regenerate ferric chloride. No estimates made of working costs of above processes. P. R. MIDDLETON, *Eng. Min. J.-Press,* 9-9-22, 2500 w. CJW.

Ammonia Leaching of Zinc Ores. Important insoluble zinc compound, with reference to ammonia leaching, is a lead-zinc silicate. High pyrite content also promotes silicate formation, but in much lesser degree than lead. Difference between extraction in excess of dilute sulfuric acid and in the ammoniacal solution is fair measure of silicate formation. Roasting in Wedge or similar furnace for ammonia leaching would demand more care than roasting for sulfuric acid leach. Strength of ammonia solution to be used determined largely by the character and efficiency of the ammonia distilling and condensing equipment. Practically all of the sulfate sulfur of the calcine appears in the solution as ammonium sulfate. Considerable of the copper and cadmium, and small amounts of iron, manganese, zinc and arsenic are dissolved. Continuous leaching can be done in covered steel tanks of parachute design, agitated by cast-iron centrifugal pumps. Distillation is best done in two stages, in which volatile ammonia and carbon dioxide are expelled in the first stage, and 90% of the zinc is precipitated as basic zinc carbonate. Basic zinc carbonate and hydrate filter cake would be combined and calcined at 300 to 400° C. in muffle furnace. J. F. CULLEN and T. E. HARPER, *Eng. Min. J.-Press,* 8-5-22, 1200 w. CJW.

Dust Sampling Apparatus. This consists of a conical tall, flat-bottomed assay flask or precipitating jar of 500 cc. capacity, provided with a 2-hole rubber stopper. One hole contains the impinger tube, 5/8 in. in diameter and 9.5 in. long, while the other is connected with an exhaust through a flow meter. The apparatus is more efficient than the sugar tube method, and has the advantage over this method in having very low control errors and much simpler in laboratory manipulation during analysis. L. GREENBURG and G. W. SMITH, Bureau of Mines, Reports of Investigations, No 2392, 9-22, 600 w. CJW.

Sund-Diaz Flotation Machine. Modification of the Callow and Inspiration types. It is 4 ft. wide, 60 ft. long, with an inclination of the bottom of 25%. The depth is 2 ft. throughout the entire length. The baffles are 2 ft. apart. Each cell has its own water level, these levels being varied by raising or lowering the baffles. No particular water level is generally necessary. Electric motor in middle of machine on vertical shaft of which impeller is mounted to aid in the production of froth by mechanical agitation. Capacity is 500 tons in 24 hrs. F. A. SUNDT, *Eng. Mining J.-Press,* 9-30-22, 500 w. CJW.

Compressed-Air Leaks. New use for geophone consists in locating compressed-air leaks buried under 1.5 to 2.5 feet of fine rock fill. Instrument cannot be depended on to locate small leaks. Several leaks were audible with geophone at distances varying from 15 to 30 feet. Considerable leak in low pressure line was found at distance of 10 feet. After detecting leaks, no difficulty was found in locating them exactly. B. O. PICKARD, Bureau of Mines, Reports of Investigations, No. 2380, 2 pp., 8-22. CJW.

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OILS·PETROLEUM

Oil Production Fails to Drop

EFFORTS of the oil industry to curtail production, in view of the surplus, apparently have not been successful, if the figures of the U. S. Geological Survey and the American Petroleum Institute are fair criteria.

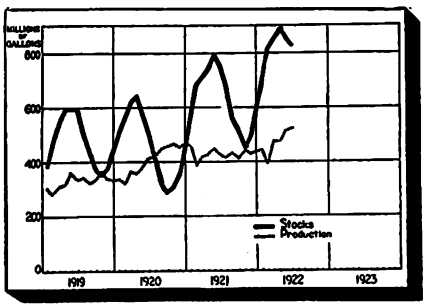
According to the Petroleum Institute, the daily average gross crude oil production in the United States for the week ended Oct. 14 was 1,555,050 barrels, as compared with 1,544,000 barrels for the preceding week. The daily average production east of the Rocky Mountains was 1,135,050 barrels, as compared with 1,134,000 barrels the preceding week. California production was 420,000 barrels as against 410,000 barrels.

The Institute also reported that pipe line and tank farm gross domestic crude oil stock in the country increased 1,643,000 barrels during the month of September. Imports of crude and refined oils at the principal ports of the country for the week ended Oct. 14 totaled 1,990,814 barrels, the report said, a daily average of 284,402 barrels, as compared with 1,785,597 barrels, or a daily average of 255,085 barrels for the week ended October 7.

The outstanding facts of statistics of crude petroleum for September, according to the U. S. Geological Survey, are that imports continued to decrease and consumption to increase, which resulted (there being only a slight increase in production) in the smallest net addition to stocks, 1,363,000 barrels, that has been recorded since October, 1921. Daily average production, which has remained close to 1,500,000 barrels for the last seven months, amounting in September to 1,508,200 barrels, increased slightly, owing primarily to a gain of 24,616 barrels in California which more than offset losses in most of the other States, including 7,711 barrels in Texas and 6,868 barrels in Oklahoma. The decrease in imports of light crude oil from Mexico from 6,217,000 barrels in July to 2,683,000 barrels in September emphasizes the falling off in production of the Southern fields.

Oil Supply of World. Today U. S. oil fields are supplying 62% of world's supply, while it is consuming 75% of that total supply. Oil supply estimated in 1921 to be 70,000 million barrels. Concentration of world's oil resources in northern sub-temperate and tropical regions of earth. Two-thirds of world's oil reserves outside of U. S. are not open to development by American companies. U. S. estimated to have reserve of 9,150 million barrels, of which more than 4,000 million barrels belong to heavy group containing the fuel oils, and are found in Pacific Coast, Rocky Mountain and Gulf States. Oil production of U. S. must at early date pass its peak and enter upon long-drawn-out period of general though fluctuating decline to ultimate exhaustion. Date of peak depends upon foreign supplies. Collapse of Mexican field imminent. Extent to which failure of Mexican production may be disastrous to this country depends upon completeness of the slump. Need of foreign oil reserves available for continued use in U. S. is obvious. Waste in production, in transporting and using oil should be prevented or curtailed as far as is economically possible. More thought should be given to more efficient use of oil now available. More researches should be carried out on production of liquid hydrocarbons through low temperature carbonization processes. Oil shale deserves earnest and wise consideration. DAVID WHITE, *Oildom*, 10-22, 3500 w. CJW.

Shale Oil. Bureau of Mines reports that 70% sulfuric acid is most effective strength to use in refining naphtha from this particular oil. Scrubber naphtha recovered from activated charcoal is of extremely good quality, although it is slightly over 30% saturated. Its color is slightly off water white and appears to be permanent. Gasoline obtained from crude oil appears to be deficient in more volatile fraction. In order to make gasoline meet present-day specifications, it would be necessary to blend it with some lower boiling material, which can probably be obtained by scrubbing retort gases. Activated charcoal seems more satisfactory for this purpose than ordinary oil scrubbers. CJW.



(Federal Reserve Bank, Philadelphia)

The violent fluctuations in stocks are attributable to the seasonal demand for gasoline from automobile owners.

Mud Laden Fluids. Technical discussion of mud laden fluids and tables on specific gravities and collapsing pressures. Use of these fluids necessary adjunct in rotary drilling, both for mudding operations and in holding down heavy pressures not controllable with clear water. Mud judged by consistency rather than by actual weight. Samples should be weighed frequently. Clays should be noted when discovered because of shortage. Cement mud mixtures cannot be used because cement will set. Lead concentrates are not suitable because they settle out too rapidly. Iron oxide will not cake or settle out of the water and a mixture of 16 lbs. per gal. of an oxide containing 85% iron was very fluid and easily handled by the pump. Iron oxide is also valuable in stopping small leaks in collars or joints of casing. Calcium carbonate does not have sufficient weight to be of value. B. K. STROUD, *Oil Weekly*, 9-9-22, 2500 w. CJW.

Guarding against "Bottom" Water. When drilling in territory lacking easily recognizable marker formation, considerable care must be exercised in determining final point for excluding top water and in selecting final depth to drill the well. Important to use great care to avoid drilling to point within short range of edge water, to avoid drilling into bottom water and to avoid permanently mudding off or seriously injuring low pressure oil and gas. Can be avoided by application of ordinary engineering methods, which allow conclusions to be reached from study based on data of neighboring wells. Few wells have been finished with cable tools, and that method is more satisfactory than rotary tools, because work of changing rig to suit cable tools is not lost, drilling may be done without mud and usually with much less fluid in the hole, and running bailer to clean out drill cuttings gives accurate formation samples every few feet and sample can be obtained at any desired depth with little delay. Sometimes necessary to use care in removing tools from hole lest well blow in. H. W. BELL and J. B. KERR, *National Petroleum News*, 9-13-22, 1000 w. CJW.

Lubricating Oils. Lubricating distillates require further refining. Chemical treatment consists in thoroughly mixing distillate with sulfuric acid and allowing sludge to settle. Oil then transferred to second agitator where it is neutralized with caustic soda or other alkali. It is then washed with water to remove the excess of alkali and the alkaline reaction products. Disagreeable odor of lubricating distillates due to sulfur and nitrogen bodies. Sulfuric acid treatment removes unsaturated hydrocarbons, sulfur and nitrogen compounds and asphaltic and bituminous substances. Details of process given. *Petroleum Age*, 9-15-22, 3000 w. CJW.

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Paper Trade Normal Again

THE paper industry has returned to normal production, in the opinion of *The Paper and Pulp Industry,* organ of the American Paper and Pulp Association. Production for this year, the association thinks, will exceed the 1921 record by at least 6,800,000 tons.

The figures for the first eight months of 1922 show that production and shipments were the largest for 23 months, and only slightly under the figures for September, 1920. Production is now equal to normal consumption, and this year's production for the first eight months was 37% higher than for the same period last year.

The cost of producing all grades of fine paper has advanced steadily and has resulted in a recent increase, by some mills, in the price of their finished products. All grades of pulp have recently advanced in price. Prices of paper stock are so high that it is out of all proportion to any other fibre, and it has been reported to cost more at the beater, in a book mill, than bleached sulphite. Writing paper production for the first eight months of 1922 is about equal to the production for the entire year of 1921. The production of book and tissue papers in the first nine months of this year has approximately equalled all of last year's production of these grades. Newsprint consumption in 1922 will be about 13% larger than in 1920.

According to the Department of Commerce survey of current business, production in August increased in all grades with stocks declining, causing prices to show a tendency to slight advances.

Paper Industry in China. Four special papers are of interest: Bark paper from the paper mulberry; rice paper, so called, which is sliced from a pith; coarse paper, made from rice straw or reeds; bamboo paper, made from young bamboo trees. Each is made by method more or less distinctive so manufacture of each will be given in detail. All industry is in hands of small proprietors. It is somewhat seasonal, as old pulp is just about used up when new bamboo is ready for cutting. Only one attempt known to erect modern type of paper mill, which was to supply drawing paper. Failed because of location, size of local market and demands for immediate dividends. Bamboo can be made to produce paper of high quality under competent supervision. Rate of growth would assure supply of raw material for modern mill. H. K. RICHARDSON, *Chem. Met. Eng.,* 8-9-22, 2000 w. CJW.

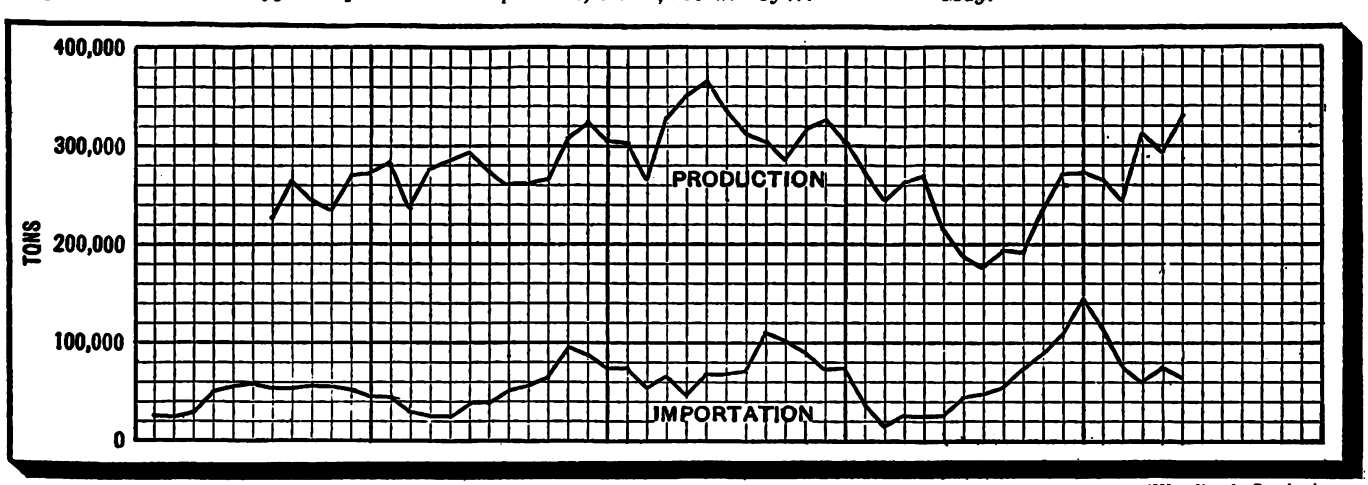
Photomicrography of Paper Fibers. Description of more important factors. Carbon arc can be advantageously replaced by an incandescent stereopticon lamp. Working qualities of most objectives may be greatly improved by use of proper light filters. Three types of filters are discussed. Purpose and proper use of substage condenser and diaphragm are discussed. Different types of photographic plates are described and suggestions as to best type of plate to use for photomicrographic work are given. Suggestions for staining and preparing material to be photographed are included as well as some suggestions as to value of photographs for permanent records and in the study and control of materials and mill processes. R. E. LOFTON, Bureau of Standards, Tech. Paper No. 217, 22 pp (5 cents), 8-2-22. CJW.

Breaker Beater. New beater capable of handling from 50 to 150 tons per 24 hours. Heavier than standard construction. Roll has bars 1 in. thick and 10 in. wide, spaced 12 in. centers and held in place by individual rings 8 in. in diameter and thus holding bar securely and permitting any single bar to be removed. Shaft, of steel forging, extends only to mid-feather. Bearings are water-cooled, of trunion type and supported by specially designed springs. Tubs are of concrete and are 40 to 75 ft. long. Breaker set below floor line, top being covered except at furnishing point. Equipped with Brownell-Buehler perforated backfall, which permits stock to pass automatically from breaker when sufficiently disintegrated. Head box discharges into sump, from where it is pumped to settling trough. Dirt is therefore removed at this point. Advantages are saving of labor, saving in repairs, better sheet, use of cheaper stock and saving of power. *Paper Mill,* 8-5-22, 750 w. CJW.

Continuous Causticization. Apparatus includes continuous causticizer, decanter, rotary filter, rotary kiln, continuous lime slaker and certain auxiliary apparatus. First step in design of causticizing apparatus is provision for positive and uniform boiling and agitation. Second step is separation of hydrate from sludge and third efficient washing and drying of sludge. Last step is calcination of sludge as it comes from filters and its return as quicklime to causticizing operation. W. D. MOUNT, *Paper Trade J.,* 8-14-22, 900 w. CJW.

"Scott" Evaporator. Discussion of the design of the evaporator. Combines all advantages of both full or submerged tube type of evaporator as well as those of "film" tube type of machine. Description of operation. Steam is used outside of tubes and liquid which is to be evaporated in inside tubes, so that tubes are really immersed in bath of steam and heating surface is in best possible condition to do maximum amount of work. Tubes easily cleaned. H. AUSTIN, *Paper Trade J.,* 8-14-22, 2500 w. CJW.

A Danish physician, who formerly manufactured artificial legs out of papier mache, now makes artificial feet out of paper pulp.—*Steam Shovel & Dredge Mag.*



(Woodlands Section)

Production and importation of wood pulp in the United States, 1918-1922.



Should a Central Station Sell Steam?

HOW can a central station save coal and eliminate waste? In the opinion of *Central Station,* important economy can be effected by the sale of steam to consumers for heating purposes. The steam heating load, in the opinion of this magazine, should be developed to as high a point as possible, and the sale of power can then be carried on with greater profit than formerly. The magazine says:

"The problem is this: Can the heating load be made great enough to make the power load secondary? By this means the peak vanishes. But the heating load referred to is that of live or exhaust steam sold to consumers, with or without electricity. The loss of heat in exhaust steam, due to the abstraction of the power for electricity, would not lessen its value one bit as a source of heat to consumers. Consequently, is it not advisable to have a very heavy steam heating load, greater by far, most of the time, than the light or power load?

"Why not? It is money, just as much as coal and heat, as gold or notes. Each of the items, comprising the heat units, must be given a solid value. Then the heat in the boiler, in the water, can be compared with that lost.

"Modern methods aim to decrease the difference between the total heat of the coal and the heat absorbed by the boiler. This difference has been steadily reduced. It was reduced by saving heat by using the exhaust steam. It was reduced by extracting otherwise lost heat in the flues. A great gain resulted from the reconstruction of the prime mover. The modern turbine, the modern boiler, the automatic stoker, the careful measurement of water and coal, all contributed to the one end. When results did not tally with expectations, investigations were set on foot to definitely localize losses. The American Society of Mechanical Engineers boiler test code gives the elements of a heat balance. The sum must total the heat latent in coal. The difference, unfortunately, between that produced and used, is still seriously great."

Power Costs. Checking of power falls into two divisions: Where power plant is installed and operated by mining company, and where power is purchased from central station. Methods of calculating power costs in each case. Origin and meaning of readiness-to-serve charge. Important to mine owner that peak period should be longer than five minutes. Lowest net rate per kilowatt-hour on total billing will accrue if peak is kept down to as small a fraction of the total power as possible. Advocates monthly tabulation sheets of power costs. All large power users should install curve-drawing meters. *Coal Age,* 9-28-22, 2500 w. CJW.

Power Transmission. Rating of belt depends upon surrounding conditions, life expected from belt, prospective overload, etc. Values given for effective tension (difference between tension in light and slack strand) allowable for each inch of width of belt. Also for arc of contact on the smaller pulley, which should never be less than 155°. When excessive center distance is required to give desired arc of contact a short center drive with flexible idler should be used. Type and weight of belt just as important as horsepower rating. Important factor is ratio of belt thickness to diameter of pulleys. Calculations also given for belt speed, pulley r.p.m., rated horsepower transmitted, diameter of pulley required and length belt, pulleys of nearly same or different sizes and for crossed drive. (To be continued.) ROY C. MOORE, *Belting,* 9-22, 1500 w. CJW.

High-Pressure Steam Heat. The use of a reducing valve in a steam-heating line does not, in itself, have any effect on the economy of the heating. If a steam motor is substituted for the reducing valve, the heating value of its exhaust is decreased by the amount of heat turned into work by the motor. Line drop is merely distributed throttling and has no direct effect on the final heating value of the steam. By generating at high pressure and transmitting through a small line, with large line drop, the heat loss from the line may be made much smaller than when the pressure is low throughout the system. E. BUCKINGHAM, *Mechan. Eng.,* 10-22, 2000 w. CJW.

Electric Steam Generator. Electric generation of steam has been developed in principle and practice to a definite place in engineering work. Its main features are settled. It has been proved simple, reliable and safe in daily operation. It may be profitably utilized in localities where fuel cost is high and hydroelectric power is available on a low firm-power rate. The device may well be used by central stations to consume their surplus power and by others who have surplus power under a firm-power contract. Among the advantages inherent in the electric steam generator are the elimination of fuel transportation, storage and handling; elimination of ashes, smoke or dirt; its ready adaptability to the use of surplus power; and its constant readiness for service without large standby losses. It can be located where it is most desirable and requires a minimum of attention. Long pipe lines are unnecessary when this apparatus is used. HORACE DREVER, *J. Ind. Eng. Chem.* 10-22, 2000 w. CJW.

Corrosion. If oxygen of water can be removed and be prevented from reentering, corrosion difficulties must ordinarily cease. Two ways of accomplishing this. One is to bring water into contact with large mass of replaceable iron or steel having large surface, so that oxygen can use itself up on low-priced metal. The corrosion method of removing oxygen from boiler feed water is exemplified in Europe by the Kestner process, in America by the Speller process. Description of Kestner "degasser," which is nothing more than tank full of steel turnings and provided with valves and piping of such nature that feed water may be passed through bed in either direction at will. *Power,* 10-3-22, 1000 w. CJW.

Constant Low Draft. Simplest method is to put fireman at damper or induced-draft fan and have him change it every time the draft gage moves. Another method is to carry constant loads on all boilers in a plant except one. Automatic apparatus also available. To determine efficiency percentage CO_2 increase due to low draft over fire should be determined, converted into terms of furnace efficiency and applied to the coal bill; savings due to decreased flue gas temperature and allowance for longer life of furnace should be added to this and balanced against increased cost of operation. Concrete example of computations to determine this value. Objections are reviewed. No engineer can afford to overlook general principle that low constant draft over fire effects very real economies. E. M. ELIOT, *Power,* 10-3-22, 2000 w. CJW.

Mechanical Draft. Burning low-grade fuel and developing high ratings call for powerful fan equipment. Tests reported on low speed, axial feed, centrifugal blowers. Results shown in form of curves and covers variation of steam consumption with load, average draft drop through boiler setting, effect of closing dampers on high-and-low-speed fans, and relation of draft, heat transfer and gas velocity to boiler rating. Important thing is to approach problem in common-sense manner. A. W. BINNS, *Power Plant Eng.,* 10-1-22, 1800 w. CJW.

Power Plant in Sugar Refinery. American Sugar Refinery Company on Patapsco River, Baltimore, Md. Noticeable features are that the plant is equipped throughout with direct-current motor and power equipment and that Corliss engines are used as prime movers in face of present tendency in this and other industries of like size toward turbines. Analysis of situations that led to selection of these features. R. B. STEVENS, *Power,* 9-19-22, 3500 w. CJW.

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RUBBER PLASTICS

Prospect Fair for Tire Industry

ROGER W. BABSON believes that the outlook for the tire industry is only fair, and doubts that prices will rise.

"Profits in the tire industry during the next eight months will be poor to fair," he says. "Only the better-managed concerns will enjoy the latter rating. The expectation that tire prices are about to rise as a result of higher raw material costs will probably prove but poorly founded. Competition will continue the dominant price and quality factor. No further general decline in prices is looked for. Nevertheless, lower prices are not without the limit of probability. Competition is sharp. The successive price reductions and the variety of buying terms with which the various manufacturers seek dealers' orders show the continued pressure of competition.

"The advantage in cost of manufacture held heretofore by the smaller tire concerns is passing to the larger manufacturers. The cost of making a casing figured on the basis of current prices for rubber, pigments, and labor is higher now than for some time. But some of the larger manufacturers in the early months of this year were producing tires with fabric contracted for at the peak prices of 1920. Current fabric prices must look comparatively cheap to them. Furthermore, the larger manufacturers are now operating at much lower overhead and labor costs than for several years.

"There is reason, therefore, for believing that even at present prices, the larger concerns are in an improved position. The smaller concerns will feel their competition more keenly as time passes. Should prices be held at the present level or lower, failures and withdrawals from the industry will increase.

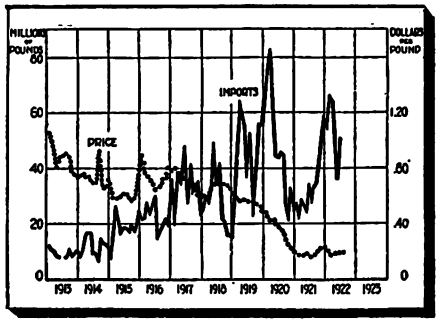
"Based on very incomplete figures of production, it is estimated that the industry will produce about 33,000,000 casings this year. Production will exceed this figure next year. Dealers are ordering on a hand-to-mouth basis. Manufacturers' terms are being framed to encourage spring orders. In some cases, prices are guaranteed into late spring. The probabilities are that production will be somewhat larger this winter than last."

Trend of American Markets. Comprehensive survey of export field for fiscal years 1920-21, and 1921-22, illustrated by graphic charts, prepared by U. S. Dept. of Commerce. Shows exports to Canada, Great Britain, France, Germany, Italy, Australia, Spain, India, South Africa, Argentina, Cuba, Holland, Brazil, Mexico and New Zealand. Importance of each market. *Rubber Age*, 10-10-22, 2500 w. CJW.

Physical Tests of Rubber. General directions for testing rubber goods, including tensile strength, stretch at break or ultimate elongation, recovery or set and friction or adhesion between rubber and fabric. Preparation of test specimens, influence of temperature, influence of rate of separation of the jaws and testing machines. A. H. NUCKOLLS, *Belting*, 9-22, 1500 w. CJW.

Coefficient of Vulcanization. The amount of combined sulfur at the standard cure depends upon the way in which the rubber is prepared, upon the trees from which the latex is obtained and also to a less extent upon unexplained variations in the finished rubber. As the average time of cure increases, so the average amount of combined sulfur at the standard cure decreases. The resin of crepe rubber has little influence on the rate of vulcanization; the resin of sheet rubber acts as a mild accelerator, while that of slab rubber contains a strong accelerator. Whether the time of cure of the rubber-sulfur mix (90:10) is estimated by chemical or physical means, the results are approximately the same, as long as similar forms of rubber are compared. The differences are larger when dissimilar forms, such as sheet and crepe are compared. G. MARTIN and F. L. ELLIOTT, *India Rubber World*, 10-1-22, 800 w. CJW.

Rubber Latex. Rubber latex is the milky juice of the rubber trees, which possesses the density of cream, is slightly amber colored, mixes with water, but not with naphtha or any other solvent



(Federal Reserve Bank, Phila.)

The declining price of rubber since 1913, in spite of increase in consumption, has been due to over-production, caused by the maturing of many plantations in the East Indies. The more rapid price decline since 1918 resulted from the expansion of imports following the release of shipping late in that year. Prices shown are for Para, up-river fine, which are much higher than on plantation rubber.

of india rubber. It contains about 32% of pure india rubber, 15% of extractives and mineral matter, and 50% water. It coagulates and often becomes putrid in a few hours or days after tapping unless a preservative is added (ammonia, formaldehyde, sodium fluoride, creosote, etc.). Interest at present time is due to proposed use in paper. *India Rubber World*, 10-1-22, 1200 w. CJW.

Balata Industry. Balata gum is heavier than rubber, has a greater tensile strength and does not slacken like rubber; it does not deteriorate or perish as rubber, and water has no adverse effect on its life. Used for manufacture of belting, insulation for submarine cables, boot and shoe soles, etc. Recent decline in industry is due to competition of hide belting, which sells for approximately one-third the price. Description of the industry in the Orinoco River Valley. About 10,000 square miles being worked. Trees are cut down, in spite of law, and each tree yields about 30 lbs. balate, as compared with one-half pound when incision is made in standing tree. In Venezuela balate made into blocks, in British Guiana into sheets. At present rate, industry will approach extinction in 5 to 10 years, unless new territory opened up. Once trees are bled, wood loses its durability, becomes brittle and is easily subjected to ravages of insects. H. D. BAKER, *Rubber Age*, 9-25-22, 1200 w. CJW.

Bakelite. Bakelite is synthetic product, a condensation product of carbolic acid or phenol and formaldehyde. Homologues of phenol may be used. After first hardening it cannot be dissolved by alcohol or acetone, nor can it be hardened. Has a transparent amber color. Used extensively as binding substance in molded insulation by mixing it with various filling materials such as asbestos fiber and wood flour. They not only reduce shrinkage in molding, but greatly improve the product. Applications in art of plastic molding are innumerable. Manufacture briefly described. Plates, rods and tubes are built up by laminating plies of tough paper or linen impregnated with Bakelite varnish, and are then subjected to heat and heavy pressure to change binder into infusible and inert state. It is a heat-resisting, highly dielectric material. Impervious to oil, steam, water or any known solvent. Applications listed. *India Rubber World*, 9-1-22, 1000 w. CJW.

Safety in Rubber Factories. General discussion of methods of safeguarding health and life of workers in factories. Mill and calender rolls offer perhaps greatest opportunity for crushed hands. Employees must learn to use knives and shears properly. Must insist on careful handling of equipment. J. A. BOWERMAN, *Rubber Age*, 9-10-22, 1500 w. CJW.

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Syrup as a By-Product

MUCH discussion is going the rounds in the sugar industry on the possibilities of developing the manufacture of by-products by cane and beet sugar factories. It is often suggested that molasses be distilled to produce alcohol, ether and carbon dioxide, all of which are in demand at a profitable figure.

In the opinion of *Sugar*, the by-product which presents greater possibilities for exploitation is syrup. This magazine says:

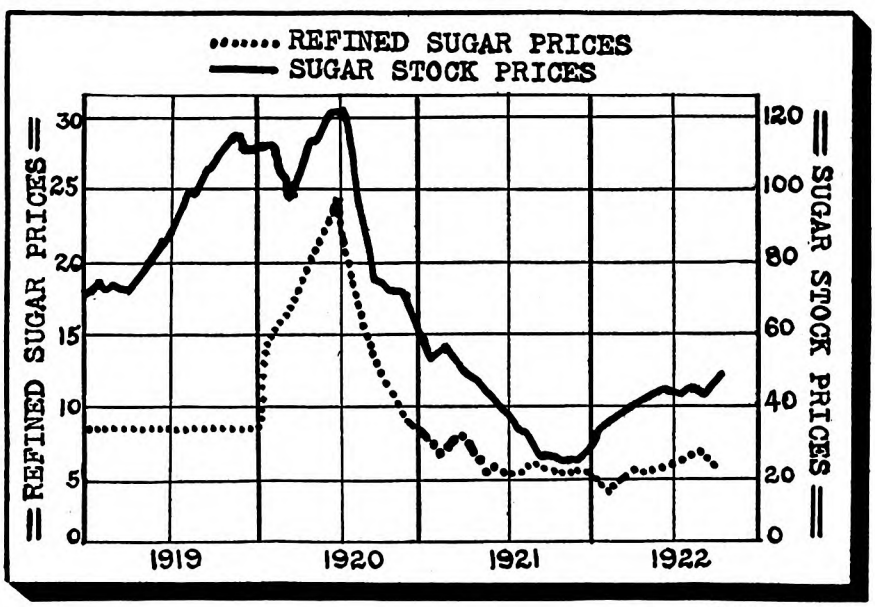
"For a great many years sugar factories, notably those in Louisiana, have produced syrup, which has been sold in the local market. This syrup has been produced under various conditions and no attempt has been made, in most cases, to grade it in such a way as to insure a uniform product to the consumer. Like the apples of New York State, which are marketed in bulk by the farmers, the sugar factories have given little heed to the possibilities which would seem to offer so tempting an aspect. Several of the large refineries of the Atlantic Coast have developed syrups for table use which they market under trade names, and in the making of which great care is used, both to secure uniform grade and palatable taste.

"Much of the opportunity for the sucrose syrup industry in the United States and even in Europe and other parts of the world, in the past few years, has been the high price demanded for maple sugar. The latter has always been recognized as the supreme quality syrup, and, as long as maple sugar and syrup were obtainable at a reasonable price, there was no chance for the sucrose syrup producer. In the past few years, however, maple syrup has assumed the role of a luxury and the cane refiners have seized the opportunity thus presented."

Sucrose Content of Cane. Canes that are cut before they have reached their maximum development and therefore have a low sucrose content, with a percentage of glucose three times the normal, can be converted into canes of better quality by keeping them in the shade and at a temperature no higher than 18° C. This transformation also takes place in the winter season, and although it loses little, comparatively, in weight, its richness follows an ascending course until it reaches a maximum. J. C. QUEVEDO, *Sugar*, 9-22, 1200 w. CJW.

Raw Sugar Clarification. Commonest defecation method is by means of phosphoric acid and lime; sulfur dioxide has been substituted for the acid in some cases. The use of lime, following with carbon dioxide and finishing up with sulfur dioxide might be cheap and effective. Other processes based entirely upon mechanical filtration. One system uses kieselguhr. If the leaf press is precoated with kieselguhr the filtered liquor is practically clear and the filtration is rapid. The kieselguhr can be recovered. Recent proposal is to use activated carbons, which have from 50 to 75 times the decolorizing power of ordinary bone black. *Sugar*, 10-22, 1400 w. CJW.

Invert Sugar. Commonly stated that increase in sweetening power of 30% is gained by conversion of sucrose into invert sugar and for this reason invert sugar has been advocated in manufacture of bottled drinks. Various samples of invert sugar were prepared, using acid and invertase for the inversion and comparative amounts compared with sucrose as regards sweetness. Results showed that a 2% sucrose solution is about as sweet as a 2.35% invert sugar solution, or 117 units of invert sugar would have the same sweetening power as 100 units of sucrose. The slightly harsh sensation present in certain of the sirups was lost in the finished product. Bottled sodas made with invert sugar showed satisfactory keeping qualities. J. W. SALE and W. W. SKINNER, *Sugar*, 10-22, 3000 w. CJW.



(*Financial World*)

Prices of refined sugar and sugar stock, 1919-1922.

Hard Candy. Hard candy is made in the continuous cooker with which a vacuum can be maintained in the cooking chamber. Degree of cook is controlled by speed of pump. As amount of corn syrup in batch is decreased cook should be increased. Sugar, corn syrup and nulomoline may be used. Another type of cooker does not use a vacuum. Steam is employed at quite a high temperature. Goods pass through this cooker so rapidly that but little sugar is caramelized. So-called combination cooker first uses no vacuum and then finishes under an almost perfect vacuum. No such thing as a perfect formula or process. No combination which does not call for constant care and very best factory conditions. MATTHEW BERMAN, *Candy Factory*, 9-22, 2500 w. CJW.

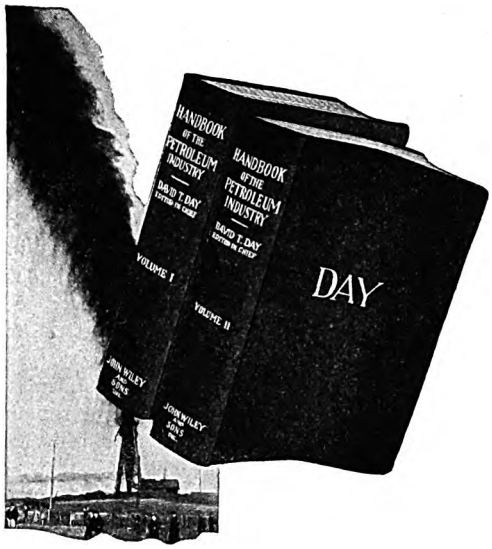
Specifications. Introductory article on purchasing candy factory supplies, which points out practical value of specifications, their legal importance, etc. Only natural that shipper should discriminate in favor of discriminating buyer. *Candy Manfg.*, 9-22, 1500 w. CJW.

Specialties. To secure all-year-round business, manufacturer must bend his efforts to produce, particularly in the off-season, those specialities which tempt people to buy ice cream when the primitive desire for a cooling delicacy is absent. E. J. SHERIDAN, *Ice Cream Trade J.*, 9-22, 1500 w. CJW.

Nougat. Nougat is hybrid confection, a high cooked marshmallow. May be prepared by heating whole batch at once or by operating at lower speed and beating light part of batch separately. Two classes, short and chewey. Egg albumen is common agent for making nougat light. Gelatin also used. Not an easy candy to make. Discussion of difficulties and formulas for various kinds. MATTHEW BERMAN, *Candy Factory*, 10-22, 2250 w. CJW.

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Railway Mergers Again

RUMORS of railway consolidations are cropping up again. Mergers of all kinds are being freely discussed these days, and the railway field is one of the most fertile for this type of conversation.

The shortcomings of our transportation system are being felt more keenly by all industries than ever before, and to many persons the formation of large systems by merger appears to offer a prospect of relief.

"Rumors of sundry consolidations which are alleged to be under consideration or negotiation have been floating about the country now for some time past," says *The Journal of Commerce,* New York. "Some of these are 'rumors' and nothing more, no doubt. Others probably have more or less foundation in fact.

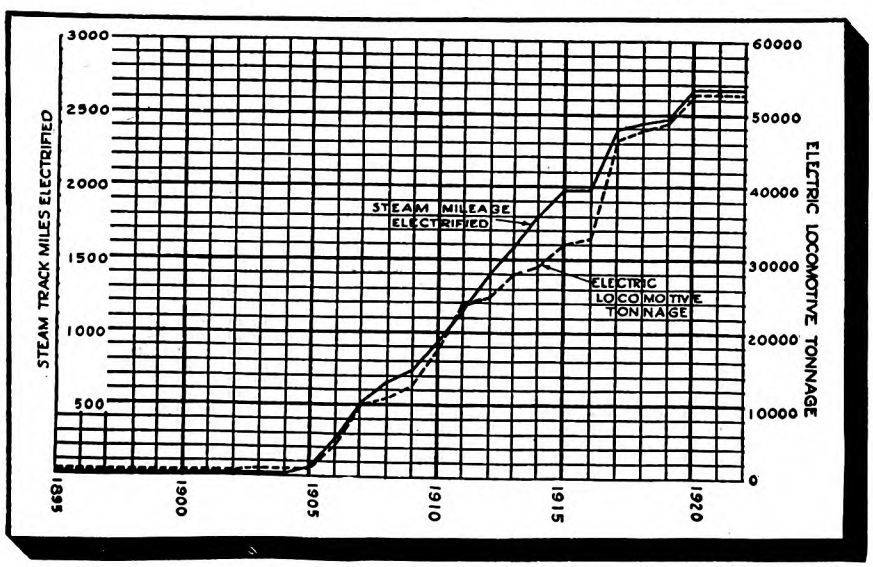
"In the meantime the numerous financial and other difficulties that beset large-scale operations or manipulations of this sort loom up as large if not larger than ever before the eyes of those best informed in such matters. It is one thing to build up great and smoothly working railway systems on paper; it is quite another and vastly more difficult task to translate these dreams into fact. There is not room for the slightest doubt that the alleged advantages readily to be obtained by integrating our roads into huge systems, consolidating terminal facilities and the like have been greatly exaggerated in the popular press and in the public mind."

Cargo Carriers of the Future. Marine designers have today the widest choice of propelling machinery ever available. From the wide variety of power units the choice of the best one is not always easy. This engineer and designer, formerly a steam man but now a convert to the Diesel, tells how and why the appeal of the Diesel is gradually but surely strengthening. He reviews the many arguments for and advantages of the Diesel over other forms. JAMES RICHARDSON, *Motorship,* 11-22, 3750 w. MAH.

Barges on Inland Rivers. Freight traffic should be independent of passenger. On waterways passenger traffic probably less than 15% of total revenue. Many suggestions given on river transport. Barges should be of steel, of low freeboard, shallow, and broad, and so designed that freight may be placed in its exact position in the barge for transport or lifted for discharging by one direct vertical movement by machinery. Many smaller barges should be towed in fleets instead of a few large ones. Barges may be about 150 ft. long, 23 ft. beam and 3 to 10 barges may constitute a fleet. H. MCL. HARDING, *Port and Terminal,* 10-22, 800 w. CJW.

Electric Freight. From study of Terre Haute, Indianapolis and Eastern Traction Co., it is concluded that freight operations on electric railways is decidedly paying proposition and should be increased in every way possible. Study of meter records of Indiana Service Corpn. shows passenger dept. consumption to be 2.58 kwh. per car mile, while that of the freight dept. was 1.31 kwh. Each passenger trailer adds about 50% to power consumed, each freight trailer 30%. L. T. HIXSON, *Electric Traction,* 9-22, 1000 w. CJW.

Safety Car. Conditions under which safety car may be operated to advantage may be divided into following general classes: 1. Lightly traveled lines where increased service will produce more traffic; 2. Lightly traveled lines where economies of operation are of primary importance; 3. Main surface lines; 4. Heavy service lines radiating from rapid transit at main trunk surface lines; 5. Lines paralleling rapid transit lines. One of most desirable features is higher schedule speeds, due to high rates of acceleration and retardation possible with light-weight car. E. P. GOOCH, *Elec. J.,* 10-22, 1600 w. CJW.



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Growth of steam railroad mileage electrified and electric locomotive tonnage in heavy traction service in U. S. and Canada.

Steel Belt Conveyors. A cold rolled sheet up to .04 inch thickness, 16 inch width, 350 feet length is used. Edges rounded and smooth. Weighs about 2 lbs. per running foot. The ends are joined by riveted lap joint. 1300 installations have been made in 13 years. Especially suitable for conveying warm, sticky, sharp or abrasive materials. Eliminates heavy maintenance costs, power consumption and spilling through joints and interstices. Friction is very low. Has great transverse rigidity and thus edges do not yield downward. Its capacity is thus very great. As the belt does not stretch, the tension devices are simple and take care of the temperature expansion. The discharge devices are simple. H. CARLSON, *Iron Trade Review,* 9-21-22, 1800 w. APS.

Mechanical Refrigeration of Railroad Cars. Three types of refrigeration: Dense-air, compression and absorption. Description of earlier experiences with absorption system. Plans of cars with refrigerating system installed. Believes mechanical refrigeration can be accomplished by equipping cars with thermo-siphon system and providing tank in roof with 2 compartments, one for receiving ice from regular icing stations and other for holding weak brine solution into which is submerged refrigerating coil. Source of energy is to come from central plant car carried in the train and having capacity for 10 cars. Brine cooled in central car would be pumped under pressure of 2-3 lbs. to coils in various cars and even remove latent heat of brine in tanks. If car is operated independently it may be iced as usual and by means of thermo-siphon system rapid automatic circulation of secondary refrigeration coils will take place whether car is standing or in motion. Central plan car should have installed within it dense-air refrigerating machine of 30 tons refrigerating capacity for 10-car unit. W. M. BAXTER, *Railway Locomotive Eng.,* 9-22, 3000 w. CJW.

Slag-Concrete Roads. Conclusions based on inspection of 100 miles of concrete road built with slag aggregate and in service one to nine years. Gives difficulties of manipulation and peculiarities of wear. C. S. HILL, *Eng. News-Record,* 9-14-22, 1600 w. CS.

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Cotton Industry Depends on Grower

CONTINUED supremacy of American cotton in world trade is dependent upon the production of cotton of high quality at relatively low cost, according to the United States Department of Agriculture in its Year Book, which has just been published.

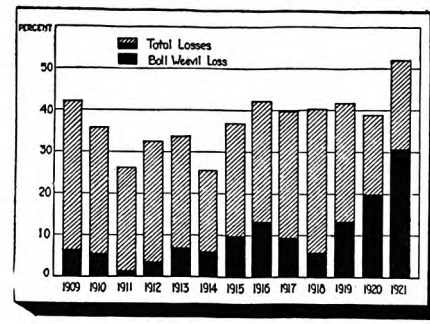
Production of high quality can be continued or restored through the adoption of proved varieties and the establishment of a single variety in communities where superior varieties of cotton can be kept pure, it is said. The custom among growers of planting many different varieties in the same locality, the practice of using ordinary "gin-run" seed for planting, and the popular idea that cotton varieties "run out" are also touched upon. The fact is, the writers assert, that many times locally selected seed of good varieties has proved better than the new stock and that some of the best known varieties have been grown continuously in the same districts for many years with no indication of "running out" as long as isolation, selection and clean ginning were maintained.

Concerning the boll weevil, it is said that a profitable crop of cotton may be raised by adopting certain measures which will control the pest under ordinary circumstances. The use of calcium arsenate in dry-dust form, which has proved fairly successful, is recommended. Other protective measures are the fall destruction of the cotton plants, either by burning or by plowing under, the use of early maturing varieties of cotton, and planting the seed early in the spring to get the crop well along before the weevils have become numerous enough to be destructive.

Economics of Cotton Industry. The outlook in the domestic market for cotton manufacturers is healthy. The underlying technical and financial conditions in the industry are sound. The indications point toward a greater expansion of the cotton manufacturing industry in America in the near future than in any other country in the world. Nevertheless, the American cotton manufacturer today seems to face exceptionally perplexing and baffling problems. He is puzzled as to what is going to happen to cotton cloth prices. How are raw cotton prices likely to turn? Are adequate supplies of cotton to be available? How is he to meet foreign competition and develop foreign markets? Will he be able to secure an adequate supply of labor? With what hours of labor and at what wages? Then there is another string of problems of a technical nature; others of mill management, such as cost accounting, layout of plant, and so on. Merchandising questions, also, are pressing strongly for solution. General discussion of these problems. M. T. COPELAND, *Textile World,* 10-7-22, 1600 w. CJW.

Future of Cotton Manufactures. Points out possible line of development for the future, especially in textile machinery. No single interesting date in development of cotton machinery since 1870, according to Draper Co. Cotton passes through 12 processes and possibly 16 machines, certain of which perform separate operations and others the same but in varying degrees. Possible combinations of machines are indicated. K. MOLLER, *Textile World,* 10-7-22, 1000 w. CJW.

Invention and the Cotton Industry. Largely historical discussion of the development of the mechanical side of the cotton industry. Among pre-eminent American inventions mention is made of ring spining, the traveller, the Rabbeth type of spindle; self-acting temple for looms, followed by the shuttle guard for looms, let-off motions, parallel pick motions, self-threading shuttles, etc., which paved the way for the automatic loom in 1894. One of most important developments is application of electric drive to

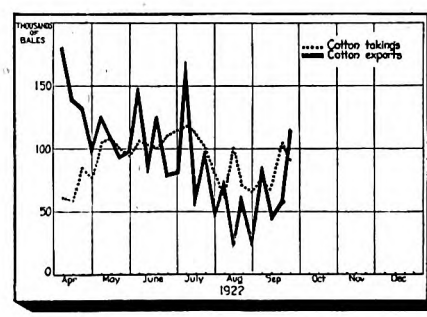


(Federal Reserve Bank, Philadelphia)

Cotton crop losses. The total columns represent that part of the potential crop which was destroyed by all causes. Losses from the boll weevil alone, which are shown in black, are growing proportionately larger.

textile machines. E. K. SWIFT, *Textile World,* 10-7-22, 2500 w. CJW.

Homespun. Woolen homespun cloth is having long inning in forefront of fashion. It is not because of cheapness, nor of any superior adaptability of cloth as regards comfort. Robust attractiveness probably important factor. Mill-made goods bear pretty much same character as original homespun. Use of nubs an improvement over earlier meth-



(Federal Reserve Bank, Philadelphia)

Exports and takings of American cotton. Until September 15 both exports and takings for domestic consumption, as recorded weekly, showed a tendency to decline.

ods of securing yarn effects. Typical constructions and colorings in fabrics of different weights. Analyses of their qualities as regards appearance and health. *Textile World,* 10-14-22, 1800 w. CJW.

Mordanting of Worsteds. Considerable saving in chrome can be made with certain dyestuffs and shades produced with less chrome and more tartar will be purer and faster in every respect against scouring and light as the combinations of the pure oxide of chromium with dye is superior in every respect to combinations of the latter with chromates and intermediate products. The fiber will also remain softer and more brilliant as the wool is only charged with pure oxide of chrome and only with the quantity of mordant necessary for dyeing without any useless products. A greater regularity of shade may be produced as the end of the mordanting operation is easily apparent as the liquid is quite discolored and the wool is always reduced to the same degree. K. R. MOORE, *Am. Dyestuff Reporter,* 9-25-22, 800 w. CJW.

Silk. In manufacture of woolens silk is used to give tone and richness to pattern. There are two methods: Twisting silk threads with woolens and weaving them into designs; and spinning two fibers in unison. Silk linings are composed of silk or mixtures of silk and other fiber. Silk possesses least diversity of physical construction. Can be depended upon to retain strength, tension, elasticity and great brilliancy under all conditions of manufacture and wear. Mohair, jute and alpaca used in place of silk lack qualities of silk. Four stages in development of silkworm-egg, larva, chrysalis and adult. Cocoons not selected for breeding purposes used to furnish raw material for textile mills. Best cocoons furnish silk filament nearly 300 yds. long. In order to test silken fabric for presence of wool, hemp, flax, ramie or jute, solution of alkaline composed of 18 grams copper sulphate in 150 c.c. distilled water, 10 grams pure glycerine and caustic soda is used. Solution will not harm silk. GEORGE RICE, *National Retail Clothier,* 10-5-22, 1000 w. JB.

Flax Retting. General discussion of processes used in Europe. Tendency is toward modern methods and if progress continues flax preparing should change from peasant industry to real manufacturing business. Retting in the River Lys. Dew retting. One result of desire for quicker method is warm water process (77 to 97°), which reduces the time to 4-8 days. Schneider's canal retting differs in mechanics and not in principle of process. Rossi process consists of boiling bundle of flax straw in water to dissolve some of the natural "gums" and to destroy all germ life. Bacteria is then added to the sterile material; these require air for growth and after first few hours action supplies its own heat. Drying is next in importance and in this the tendency is toward a cautious adoption of artificial drying. C. F. GOLDTHWAIT, *Textile World*, 9-23-22, 2000 w. CJW.

Elastic and Non-Elastic Fabrics. Embossing of elastic fabrics is form of elaboration which is not adapted to long stretch webs. Well to avoid designs which run for any great length with warp and to select effects where the general run of design is at an angle to direction of warp threads rather than with them. Process is similar to that used in embossing paper and leatheroid goods. Braiding of elastic fabrics is simple process when compared with weaving them. Plain cords are used for athletics and airplanes. Flat braids made by braiding yarn in and out between rubber threads. Fancy braided cords cover wide range. SAMUEL BROWN, *Textile World*, 9-30-22, 1500 w. CJW

Finishing Textiles. Starches used are farina, Belfast wheat, Austrian wheat, rice, sage and tapioca. Apparatine is largely used and is a perfect substitute for gum, starch stiffenings, glue, etc. Dextrine by itself does not give very stiff finish. China clay is most important filling agent. Object of sizing warp is to bend together individual fibers, thus adding strength. Use is imperative in case of single yarn. Systems of sizing are: sizing yarn when on loom, sizing in hank, sizing yarn in warp or chain, sizing yarn when spread out so as to represent sheet. Discussion of each class. Also of dressing, tape sizing and slasher sizing. *Textile American*, 9-22, 1500 w. CJW.

Scouring and Milling. Divided according to material scoured, we have high-grade woolens, worsteds and low-grade goods. According to method we have saponification, solvent and emulsification scouring. In the case of high-grade woolens may use straight alkaline scour. In the case of fancy worsteds alkali of 2 to 4° Tw. with some soap is used. Not possible at present to lay down exact lines of low-grade goods scouring operation. Question of use of solvents with low-grade scours discussed but question needs further investigation. J. SCHOFIELD, *Am. Dyestuff Reporter*, 9-25-22, 2000 w. CJW.

Texture and Threads. Relationship of texture and threads one of determining characteristics of fabric. Simplest form is one in which there is but single repeat to each interlacing of warp and filling. This is noted for its firmness, elasticity, and closeness of interlacing of threads are tightly made because there is no floating of the ends over two or more corresponding ends as in the case in many other forms of weave. Weave with two threads up and two down is popular one for wide range of fabric used for dress goods, suitings, flannels, etc. In the three-up and three-down type, substantial texture is not obtained with 40-50 threads per inch. Float may also be over five threads. Great danger in the preparation of this weave is that finished fabric will be produced that is too soft, flimsy and hard to handle. *Southern Textile Bull.*, 9-21-22, 800 w. CJW.

Dyeing Carpet and Rug Yarns. Rugs call for more colorful effects than carpeting. Dyeing bright colors and tints naturally call for extreme care in preparation of yarn and dye bath. Yarn should be of cleanest quality available. Scouring carried out in usual manner. Bisulphite of soda with addition of oil of vitriol gives very clean yarn. Preponderance of metal in dye bath will have dulling effect. May be avoided by using open wooden tubs. Advisable also to work with small batches. To clarify and brighten liquor it is necessary to run batch of clean yarn through water containing small amount of acetic acid and some of the dyestuff at 150° F. before making up bath with dyestuff. If dyer can produce required match with but one or two additions of dyestuff, clean bright color should result. Tendency to unevenness may be overcome in part by well extracting yarn just previous to dyeing. F. C. HOLDEN. *Am. Dyestuff Reporter*, 9-11-22, 1000 w. CJW.

Colors Fast to Bleaching. Turkey red still preeminent as fast dye, being resistant to most severe processes. Process of dying long and tedious and as no other color will stand similar treatment, its uses today are considerably limited. Not all vat dyes are fast to bleaching. Color fast to chlorine not necessarily fast to bleaching. Some colors will stand peroxide bleach but not chlorine, and vice versa, so that great care is necessary in selection of dyestuffs used for fast-to-bleaching range of shades. This class of color can be dyed not only on cotton but on artificial silk, natural silk and to limited extent on wool. Converter or merchant who can guarantee fastness of color in his fabrics will be able to command higher prices and obtain greater stability in his sales. H. F. SCHWARZ, *Am. Dyestuff Reporter*, 9-11-22, 600 w. CJW.

Color in Textile Fabrics. Color, tone and quality are affected by physical structure and chemical composition of fibrous material or materials selected, the yarn construction, the build or make of the fabric and the method or practice of finishing. Each have a specific and modifying influence on the behavior of the woven product in the dyeing process. Illustrated with examples. *Can. Textile J.*, 9-26-2, 800 w. CJW.

Hosiery Sizes. Causes of irregularity in sizes of hosiery due to different manufacturing conditions. Some manufacturers use wide forms, some narrow ones. Some use 3.75 in. cylinder for all sizes and some 3.5 in. Some mills board goods on boards that are same size as finished hose. Other mills board goods one-half size up. With uniform method of measurement, knitting each individual size and allowing for boarding one-half size up, thereby getting full regular size when finished all goods should be of uniform dimensions regardless of manufacturer that produces them. This would be useful standardization. *Textile World*, 9-30-22, 500 w. CJW.

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Superficially, they failed because their liabilities exceeded their assets.

Specifically, however, they failed because they could not see the danger that loomed ahead.

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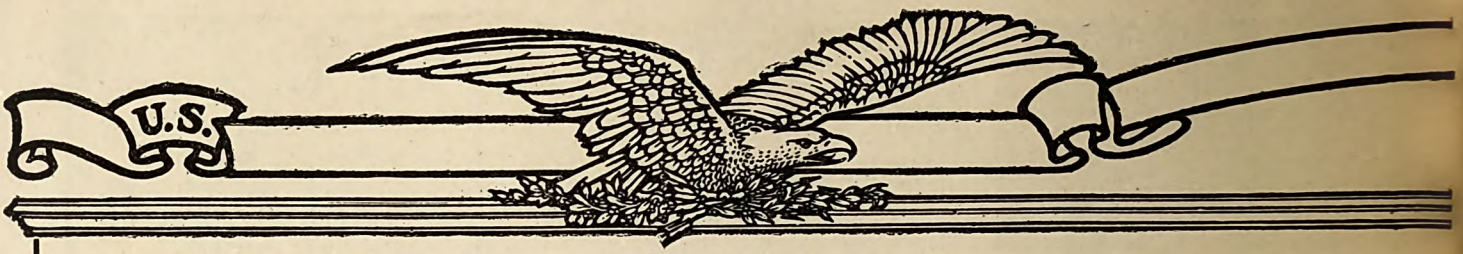
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WAR DEPARTMENT

NOVEMBER

Nov. 17—Q. M. SUPPLIES—Boston, Mass., Auction. For catalog write C. O., Army Supply Base, Boston 9, Mass.

Nov. 17 — METALS — Rock Island, Ill., Sealed Bids. For catalog write C. O., Rock Island Arsenal, Rock Island, Ill.

Nov. 21—Q. M. SUPPLIES—Camp Knox, Ky., Auction. For catalog write Q. M. S. O., 1819 W. Pershing Road, Chicago, Ill.

Nov. 23—Q. M. SUPPLIES—Chicago, Ill., Auction. For catalog write Q. M. S. O., 1819 W. Pershing Road, Chicago, Ill.

DECEMBER

Dec. 4—Q. M. SUPPLIES—New Orleans, La., Auction. For catalog write C. O., Q. M. Surplus Property Depot, Atlanta, Ga.

Dec. 7—Q. M. SUPPLIES—San Antonio, Tex., Auction. For catalog write Q. M. S. O., Ft. Sam Houston, San Antonio, Tex.

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SELLING PROGRAM

Dec. 8—LEATHER and HARNESS—New Cumberland, Pa., Auction. catalog write Q. M. S. O., 1st Ave. and 59th St., Brooklyn, N. Y.

Dec. 12—Q. M. SUPPLIES—Columbus, O., Auction. For catalog write Q. M. S. O., 1819 W. Pershing Road, Chicago, Ill.

Dec. 13—ORDNANCE MATERIALS—Morgan Depot, South Amboy, N. J., Auction. For catalog write Dist. Ord. Salvage Board, Frankford Arsenal, Philadelphia, Pa.

Dec. 15—Q. M. SUPPLIES—Philadelphia, Pa., Auction. For catalog write Q. M. S. O., 1st Ave. and 59th St., Brooklyn, N. Y.

"Early in December the large Ordnance Gun Plant and land located at Chicago will be sold. For information write: Chief, Construction Service, O. Q. M. G., Room 3337, Munitions Building, Washington, D. C."

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ARTMENT

Merchant Marine

(From page 1813)

properly belonging to and now exercised by the President, the Secretary of State, the Secretary of the Treasury, the Secretary of War, the Secretary of the Navy, the Secretary of Labor, the Secretary of Commerce, the Postmaster General, and the Congress. The bill authorizes the Shipping Board to declare valid or invalid any existing agreements between common carriers by water and common carriers by land, although some contracts have been sustained by the courts and others have been declared invalid; so that the Shipping Board is authorized to usurp the power of the judiciary, including the United States Supreme Court, if it so wills.

"The pending bill proposes so to amend the present law as to eliminate competitive bidding, and also to authorize the sale of ships without advertisement if authorized by five members of the board. It also provides for a revolving fund of $125,000,000 to be known as the construction loan fund. The Shipping Board is authorized to loan this fund for 2% interest, without any limit as to time, and without any restriction as to the amount to be loaned any person or corporation.

"This bill provides for the payment of certain basic subsidies, and authorizes the board to increase them—to double them if need be—or to decrease them. The board is authorized to make contracts for the payment of subsidies 'for a period not exceeding ten years from the date when contract is made.' It will be noted that the period does not date from the passage of the bill, so that it would be practically impossible for a future Congress to repeal the law for the reason that there would always be a number of these contracts outstanding.

"The Shipping Board is given absolute discretion to grant subsidies or to withhold them. Under such extraordinary discretionary powers it was admitted at the hearings by a representative of the Shipping Board that it was within the power of the board to grant the owner of the *Leviathan* an annual subsidy of $1,800,000 or to refuse to grant any subsidy, or to grant a subsidy in any amount between nothing and $1,800,000.

"The bill creates a 'merchant marine fund' for the payment of the voyage subsidies, 'which shall be subject to withdrawal by the United States Shipping Board on requisitions approved by the chairman of the United States Shipping Board.' This fund is to be derived from 10% of our custom receipts, which Chairman Lasker estimated will amount to about $30,000,000 per annum; by tonnage taxes, which he estimated will amount to about $4,000,000 per annum, and by the amounts which would otherwise be paid for carrying the mails, which he estimated at $5,000,000, making a total of $39,000,000. All of this the Secretary of the Treasury is directed to pay into the merchant marine fund, without any appropriation by Congress."

The *New York Evening Post* predicts editorially that the bill will fail as all general subsidy bills have failed since Hanna introduced the first in 1898:

"We had subsidy bills in the Congressional sessions of 1904-5, 1905-6, and 1906-7. The battle against the measure is a battle of a quarter century. If debate is not choked off, if time is allowed for public sentiment to awaken, the present renewal of it will end in another discomfiture for the subsidy hunters.

"It will so end because the basic objection to the subsidy bill of 1922 is the same as the objection to the bill of 1898. Everyone agreed then, and agrees now, that a great American merchant marine is desirable if it will support itself and not depend upon the taxpayer. If it can be kept going only by burdening the Treasury, then it is a drag and a curse. It will establish a principle of government that is fundamentally wrong. It would leave us no excuse for refusing other businesses a regular dole from the national funds. The seacoast having got its slice, the inland regions could demand theirs. As Senator Borah says, it would create a group specially favored with reference to taxes and the Treasury, who 'would become a body potential for the very worst kind of corruption in government.' If anyone doubts this assertion, let him read the history of the special subsidy of 1866 to the Pacific Mail and the scandal resulting in 1872, when it was found to have spent a cool million to influence Congressmen.

"Subsidy advocates have some new arguments furnished by our war-time shipbuilding; yet at the bottom the issue remains the same. If we cannot have a great merchant marine without this sort of State socialism, let us do without; but we believe that American enterprise and energy can build up a merchant fleet. It can do so on a sound basis, however, only by regarding the cost of our existing ships as a war loss and boldly selling them for what they will bring."

Railroads Still Buying

(From page 1819)

which rose steadily to 405,379,284,000 ton miles in 1918. There was a drop in 1919 and a further increase in 1920 with a heavy decrease in 1921, but with returning prosperity the indications are that the total traffice for this year will reach and possibly surpass the large figures for 1918, and yet the railroads have made comparatively little increase in the number of cars and locomotives.

RAILROAD TRAFFIC SINCE 1900

Year	Ton Mileage	Year	Ton Mileage
1900	141,596,551,161	1917	394,465,400,493
1905	186,463,109,510	1918	405,379,284,206
1910	255,016,910,451	1919	364,293,063,017
1915	276,830,302,723	1920	413,698,749,000
1916	365,771,824,741	1921	309,443,050,000

"There are about 2,500,000 freight cars in the country. The rate of depreciation largely exceeds the total number of cars ordered for recent years, and the same is doubtless true in regard to locomotives. The roadbeds have not been kept up to full standard, the rolling stock, both locomotives and cars, is to a large extent in very bad shape. No one can watch the freight trains of the country as they pass without being struck with the fact that it is almost impossible to find freight cars that have been painted within the last year or two. Thousands look as though they had not been painted for five years and thousands as though they would drop to pieces on the track. Under these conditions, the railroads are facing an ever-growing traffic, limited only by their facilities. The *Manufacturers Record* is in constant receipt of letters from shippers telling of the utter inability to deliver goods. These are facts which must be faced by railroad managers."

Money Rates

(From page 1821)

apprehension. There is a very definite correlation between the *fundamental* trend of the stock market and the course of general business. Both depend for their direction upon the favorable or unfavorable conditions of supply, demand and credit. The relation between these basic factors and the trend both of the stock market and general business is one of *cause and effect*. On the other hand the relation between the movements of the stock market and those of general business is one of *time* only. The influence of these basic factors is reflected first in the security market, and after a fairly definite period of time, generally six months, in the commodity markets. The downward changes of direction in the stock market, while the fundamental factors stay favorable, are merely secondary movements which have no forecasting significance on the main trend of business activity, and are due to technical or other temporary reasons.

"This has been the character of the recent weakness in industrial stocks. It has no bearish significance upon the course of business as a whole. *Fundamentals, however, are still strong and it can be expected that in a short time the security market will be registering prospects of active business for the spring and summer of 1923.*

Labor

(From page 1825)

employed in these centers for the past five months, while Atlanta, Ga., New Haven, Conn., and Manchester, N. H., show a gain in employment over each month for the past four months.

One of the features of the month's survey is the continued steady employment offered to the building trades throughout the entire country.

Huge highway construction programs are still under way, taking care of a tremendous amount of common labor, while large municipal programs are on foot with every indication of their continuance throughout the winter months, weather conditions permitting.

Industrial Wages Going Up

AS employment increases, wages naturally rise. *The National Industrial Conference Board,* in its bi-monthly survey of industrial conditions, reports that the upward trend in wages continues steadily. It says:

"The tendency of wages during the last two months has been distinctly upward. Labor shortages have developed during the past few months in face of only a moderate upward swing in industry. This has served as a warning that labor is not to be had in sufficient quantities. Industrial managers have evidently felt the pinch and have wisely endeavored to provide against it. Most of the wage increases reported indicate an intensely individualistic concern, and that the result will inevitably be a scramble for labor with higher wages as a bait.

"The industries of the United States are undoubtedly going through a period of nation-wide wage adjustment. The high wages in the coal-mining industry, on the railroads, in the building trades and in other favored industries have set a high standard. Less-favored industries—both the men and managers—realize their position.The voluntary wage increases that have been made in a large number of industries are indicative of this general leveling up.

"Further evidence of this tendency is afforded by the following record of monthly wage changes kept by the *National Industrial Conference Board:*

1922	Wage Reductions	Wage Increases	Total Ch'gs.
April 15-May 15	54	9	63
May 15-June 15	23	26	49
June 15-July 15	25	21	46
July 15-Aug. 15	7	8	15
Aug. 15-Sept. 15	4	119	123
Sept. 15-Oct. 15	4	65	69

"These figures, although they are not complete or exhaustive, are evidence of a movement that is rapidly extending through all industries and to all sections of the country. Increases are reported from Maine to Utah and from Ohio to Florida, and in such widely diverse industries as iron and steel, cotton, textile, paper, copper, wool and zinc. Whether, in the face of a considerably lower cost of living, this is the beginning of a continuously upward movement of wages is too early to determine. The mere facts, however, as stated above, should command the attention of every one engaged or interested in industry. Wage increases in such basic industries as iron and steel, cotton, textiles and the like, will inevitably be converted into higher prices.

"The wage increases indicate that in general the position of the wage-earner is improving. For example, the wages in common, unskilled labor in the iron and steel industry are now 80% above those paid in 1915. The cost of living has increased 55% over that of 1915. 'Real' wages in the iron and steel industry are therefore 16% higher than in 1915. This increase represents the actual gain in the relative position of the wage-earner in 1922 over 1915."

Farm Labor Wages Dropping

AS industrial wages increase, the pay of farm labor is dropping. This is a symptom of an unsound element in the general economic situation: the unfavorable condition of the farm as compared with the factory. Just why farm wages should be dropping at this time is not quite clear; yet the fact, in view of reports of the United States Department of Agriculture, is not to be disputed. The farmer apparently is not in as good condition as he should be.

The average rate of wages of male farm labor for the entire United States, October 1, was $28.97 a month with board, according to the first of a regular series of quarterly reports from 1300 county crop reporters to the United States Department of Agriculture. The average rate for the year 1921 was $30.14. By the month without board, the average, October 1, was $41.58, compared with $43.32, the average for 1921. Day wages with board, October 1, were $1.57, compared with $1.68 last year, and day wages without board were $2.08, compared with $2.18 in 1921.

Of the 1300 reports, 36% stated that the labor supply exceeded the demand at current wages, 33% stated that the demand exceeded the supply, and 31% reported an even balance. Excess of supply was stated to be most pronounced in the cotton States—Georgia, Florida, Texas, Oklahoma, and Arkansas; also in Missouri, Nebraska, and Kansas. Demand exceeded supply in New York, Pennsylvania, Virginia, West Virginia, North Carolina, and the Pacific Coast States.

Service

"I had six honest, serving men;
(They taught me all I knew):
Their names are WHAT and WHY and WHEN, and HOW and WHERE and WHO." (Kipling)

WHAT was the Declaration of London?
WHY does the date for Easter vary?
WHEN was the great pyramid of Cheops built?
HOW can you distinguish a malarial mosquito?
WHERE is Canberra? Zeebrugge?
WHO was the Millboy of the Slashes?

Are these "six men" serving you too? Give them an opportunity by placing

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Write for a sample page of the *New Words*, specimen of Regular and India Papers. Mention *Industrial Digest* when writing.

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With the Financiers

(From page 1824)

bonds, but those which have an excessive proportion of their funds in such securities should sell in order to meet the requirements of their commercial borrowers. The same with the speculators who bought bonds with borrowed money.

"For the time being the market will be unsettled. Barring the event of some great war, the fundamental trend of bond prices over the coming years should be upward. Hence our urgent advice is: (1) Own your bonds outright. (2) Buy the issues we are recommending on all recessions."

Debt Cancellations

(From page 1820)

necessary, we could voluntarily endeavor to put their obligations on such a basis as would relieve, to the greatest possible extent, the immediate burden of taxation of their people, and thereby enable them to arrive at the quickest possible rehabilitation of trade. England is the best market America has.

"In the last analysis the question of the disposition of the war debts resolves itself into whether Germany can pay the reparation levied against her. The business man and taxpayer of America will want to be convinced that every possible alternative has been tried to make Germany pay before he will consent to undertake to pay for Germany what the German taxpayer will not pay for himself."

The INDUSTRIAL CALENDAR

Secretaries of Associations are invited to send us the dates of their conventions as early as possible so that their conventions may be properly listed below. When especially requested by Association Secretaries, we will send dates and other available notices concerning meetings of other associations.

Nov. 16-18. *New England Advertising Men,* Providence, R. I. (H. Harold Price, Secretary, the Town Criers of Rhode Island Convention Committee, P. O. Box 947, Providence, R. I.)

Nov. 17. *American Electrochemical Society,* New York City.

Nov. 17-26. *International Health and Safety Exposition,* Municipal Auditorium, Oakland, Cal. (Blanks Everett, Secretary.)

Nov. 20-24. *Electrical Supply Jobbers Association,* Cleveland, Ohio. (F. Overbaugh, General Secretary, 411 So. Clinton St., Chicago, Ill.)

Nov. 20-25. *National Hotel Exposition,* Grand Central Palace, New York City. (Mark A. Cadwell, Secretary, 334 Fifth Ave., New York City.)

Nov. 21-22. *Southern Sash, Door & Millwork Mfrs. Association,* Atlanta, Ga.

Nov. 22-23. *New York State Industrial Conference,* Buffalo, N. Y.

Nov. 22-23. *National Founders Assn.,* Chicago, Ill. (J. M. Taylor, 29 South La Salle St., Chicago, Ill.) Hotel Astor, New York City.

Nov. 23-25. *Western Planing Mill & Woodworking Congress,* Palace Hotel, San Francisco, Cal.

Dec. 1. *Society of Chemical Industry,* New York City.

Dec. 3-9. *Automobile Salon,* Commodore Hotel, New York City.

Dec. 4-7. *American Society of Mechanical Engineers,* Engineering Societies Building, 29 West 39th St., New York City. (Calvin W. Rice, Secretary.)

Dec. 4-9. *American Warehousemen's Assn.,* Hotel Statler, Cleveland. (Chas. L. Criss, General Secretary, 1110 Bessemer Bldg., Pittsburgh.)

Dec. 5-6. *National Glass Distributors' Association,* Pittsburgh, Pa.

Dec. 5-7. *Southern Association of Ice Cream Mfrs.,* Gruenwald Hotel, New Orleans, La.

Dec. 5-8. *Implement Dealers' Association,* in Lansing, Mich.; Wilwaukee, Wis.; Sioux Falls, S. D.; Indianapolis, Ind. (L. F. Wolf, Secretary of Michigan Section, Mt. Clemons, Mich.)

Dec. 6. *Meeting Associated Retail Credit Men of New York City,* Aldine Club, New York City.

Dec. 6-8. *American Petroleum Institute,* Statler Hotel, St. Louis, Mo.

Dec. 7-8. *Association of Life Insurance Presidents,* Hotel Astor, New York City.

Dec. 7-13. *Exposition of Power and Mechanical Engineering,* Grand Central Palace, New York City. (F. W. Payne, Secretary, Grand Central Palace, New York City.)

Dec. 8. *American Chemical Society,* New York City.

Dec. 11-15. *Implement Dealers' Association,* in Des Moines, Ia., and Peoria, Ill. (T. F. Wherry, Secretary of the Iowa section, Des Moines, Ia., and Oscar Keller, Secretary of the Illinois section, Quincy, Ill.)

Dec. 11-16. *National Food Show,* Grand Rapids Armory, Grand Rapids, Mich.

Dec. 13-15. *Coal Mining Institute of America,* Chamber of Commerce Auditorium, Pittsburgh, Pa. (H. D. Mason, Jr., Secretary, 911 Chamber of Commerce Bldg., Pittsburgh, Pa.)

Jan. 3-5. *Midwest Implement Dealers' Association.* Convention and Machinery Exhibit, Omaha, Neb.

Jan. 8-13. *National Auto. Body Builders Show,* 12th Regiment Armory, New York City.

Jan. 9-12. *Society of Automotive Engineers,* Annual Meeting, New York City.

Jan. 11-12. *Federated American Engineering Societies,* Annual Meeting, Washington, D. C.

Jan. 15-18. *American Roadbuilders Association, N. Y. C.,* Annual Convention, Chicago, Ill.

Jan. 16-18. *Northwestern Lumbermen's Association,* Minneapolis, Minn. (Wm. H. Badeaux, Secretary, 1026 McKnight Bldg., Minneapolis, Minn.

Jan. 16-18. *Western Retail Implement & Hardware Assn.,* Kansas City, Mo. (H. J. Hodge, Secretary, Abilene, Kan.)

Jan. 17-18. *American Society of Civil Engineers,* Annual Meeting, New York City.

Jan. 22-26. *American Concrete Institute,* Detroit, Annual Convention, Cincinnati, O.

Jan. 29-31. *Automobile Electric Association,* Annual Meeting, Congress Hotel, Chicago, Ill.

Jan. 30-Feb. 3—*Associated General Contractors of America,* Washington, D. C. Annual Meeting, Los Angeles, Cal.

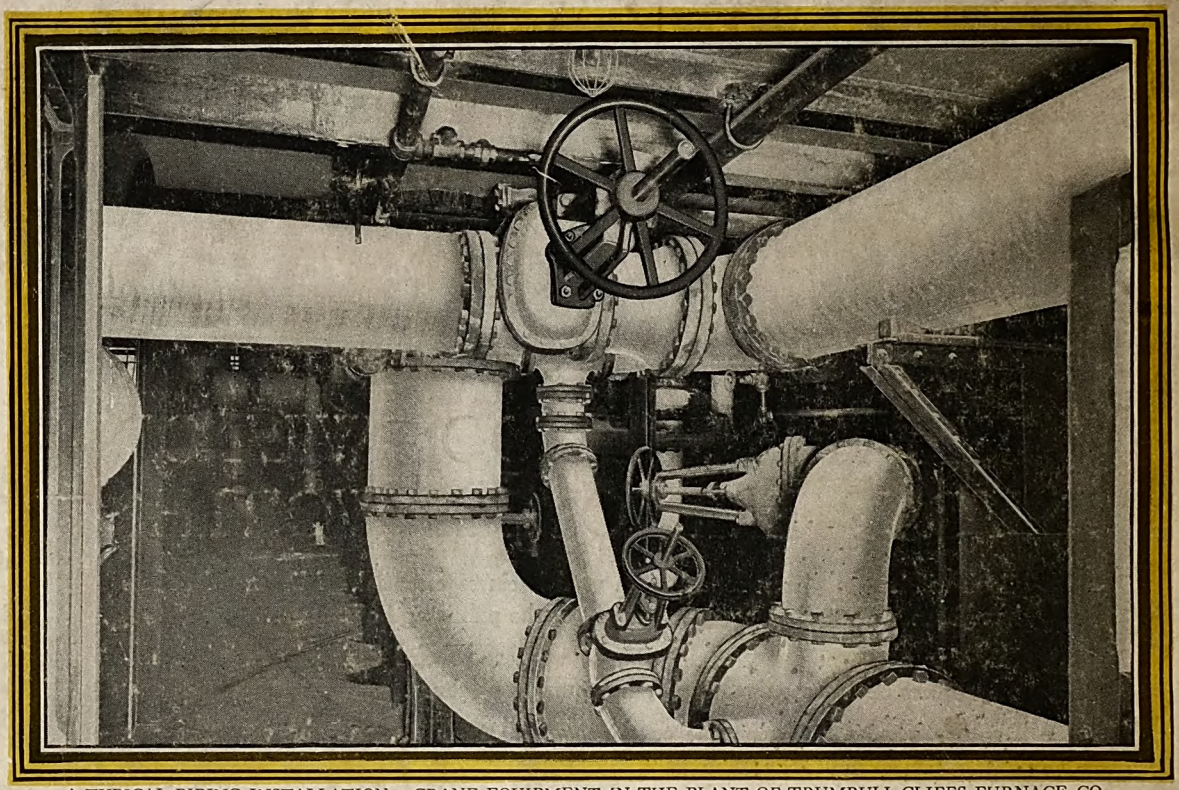
Foreign Events

Nov. 10—Dec. 19. *Automobile Show,* Palais de la Cinquantennaire, Brussels, Belgium.

Nov. 29-Dec. 4. *London (Olympia), Cycle and Motorcycle Show,* The Tower, Warwick Road, Coventry.

Dec. 15-Jan. 2—*Aeronautical Salon,* Grand Palace, Paris.

Jan. 13-24. *International Automobile and Cycle Exposition,* Palais du Cinquantenaire, Brussels, Belgium.



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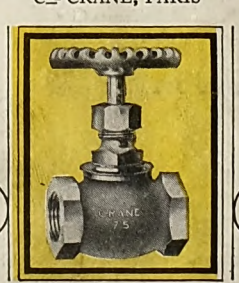
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